FLIGHT and AIRCRAFT ENGINEER

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The Outlook

Progress!

BRITISH aviation has had its good periods and its bad ones. During the last year or so, the former have tended to be overshadowed by the latter, very largely as a result of outside circumstances which did not give a true picture of the actual facts. During the last week or two, events have occurred which bear testimony to the fact that Britain's aircraft industry is still a force to command respect the world over. It is no mere coincidence that in all cases these events have been connected with gas turbines. The hard work and large sums of money put into that particular development are beginning to bear visible fruits.

First we have the convincing proof of reliability afforded by the 500 hours' test run of the Bristol Theseus axial-flow turboprop power plant run under very strenuous conditions and officially observed by representatives of the Air Registration Board. The test-bed performance proved completely successful and devoid of trouble, with the engine developing 2,000 shaft horse-power and 750 lb thrust for take-off. The technical aspects of this outstanding achievement are outlined elsewhere in this issue. In non-technical language, the test is equivalent to 20 flights from London to New York and back.

From de Havillands comes the news that another milestone has been reached by the granting of a civil type-approval certificate to the Ghost turbojet, which thus becomes the first engine of this type to be approved for public transport service. The Ghost has undergone a long development period, including many hours of flight and bench-testing under conditions more severe than will be met with in actual commercial service. For the time being, the approval has been granted for a rating of 4,450 lb static thrust and a period of 250 hours between overhauls. This is a conservative figure and will doubtless be raised in due course to the designed value of 5,000 lb or even more, without sacrificing reliability, so that by the time the Comet airframe is ready, its power plants should be thoroughly proved.

The de Havilland Goblin was the first turbojet to be officially approved for military service, and now it has achieved the distinction of being the first engine of its type to cross the Atlantic. Unusually adverse weather conditions delayed the progress of the R.A.F. Vampire Squadron, a fact which has tended to obscure the merits of this praiseworthy enterprise, in amicable rivalry with our American friends, who have to be content with being "second across" in the opposite direction.

Another British turboprop "first" was registered when, last week, the Vickers' Viscount, powered by Rolls-Royce Darts, made what appears to have been an eminently successful initial flight. A sudden *volte face* resulted in the Viscount being shelved in favour of the Airspeed Ambassador, but it is heartening to know that the firm has completed the machine and is learning as much as possible from it. It may well be, even now, that the Viscount type will not be condemned to a premature death after all.

Large Piston Engines

COMING at a time when certain criticism has been levelled against the official gas turbine policy, these achievements are impressive and reassuring. Sir Roy Fedden has expressed the view that unwarranted optimism led to the too early abandonment of the large piston engine. While there are many points in his argument with which one must agree, we cannot help feeling that he, in his turn, is somewhat unduly pessimistic about the rate of progress of the gas turbine, and more particularly the turboprop.

Sir Roy fears that the engine which is ultimately to power the Brabazon and the Saro SR 45 may be so much delayed in its full development up to civil reliability requirements that the airframes may be "frittering away an appreciable portion of their useful lives waiting for

fully fledged engines." The fact that the Theseus has completed a 500-hour run would appear to provide a reasonable basis for expecting that its larger brother, the Proteus, will be fit for use by the time the airframes are ready for it.

While we must agree with Sir Roy that it would have been reassuring if we had had a piston engine in the 4,000-5,000 h.p. class to fall back upon if our turboprops should fail to materialize in time, it is less easy to share his view that "it is not too late to remedy the position," and that if we acted at once we could still have a stop-gap piston engine for these two large aircraft. It is reasonable to expect that by the time such an engine could be produced and developed, the turboprop will have passed its teething troubles. We are supported in this view by Mr. W. R. Verdon Smith, who holds that the development of a new piston engine to the same degree of reliability is a longer and much more difficult task than the development of a gas turbine. He also emphasizes the point that a stage has now been reached where military and civil requirements have diverged so far that fundamentally distinct types of power units must be independently designed and separately developed, that the turboprop has its special place in transport aircraft, and that it must be developed especially for them.

A Fateful Decision

THE whole future of British civil aviation will be profoundly affected by Lord Pakenham's statement of Government policy. As we go to press before that statement is made, we are prevented from commenting in detail; that must be reserved for next week's issue.

It appears clear, however, that the Cabinet has decided to purchase Canadair D.C.4M-4s, a choice which must on the whole be regarded as preferable to ordering more Constellations in addition to the Stratocruisers already coming along from America, much as B.O.A.C. might have liked the latter course. From the Empire point of view the decision will be welcomed, as the Canadairs are produced and developed in Canada, even if the finance is American, and, of course, the power units are British Rolls-Royce Merlins.

Canadairs will therefore probably share the Middle and Far East and African services with Hermes IVs, and some may also operate across the North Atlantic to their country of origin. The number said to be ordered is 22, and presumably deliveries could, as for the Hermes, be at the rate of about one per month during next year.

As for the Tudor IV, this has been described by B.S.A.A. as a very good aircraft, and it is unthinkable that the Corporation should not be allowed to use this type of which at least 19 will become available.

CONTENTS

Outlook	85
Desford in the Air	87
Here and There	90
Five Hundred Hours	92
Civil Approval for the Ghost	93
Comfort in the Air	94
Nationalized Air France	96
Sweden's Air Defences	97
Civil Aviation News	101
How the Vampires Crossed	105
The Gyrodyne	106
A Private Venture	108
Correspondence	110
Service Aviation	111

The Tudor II Report

MUDDLE appears to be the word which best describes the unhappy history of the Tudor II, the Courtney Committee Report on which was issued last Tuesday. None of the parties concerned in the causes of delay comes off with much credit, least of all B.O.A.C., which insisted on certain standards of accommodation that increased fuselage weight and dimensions. The designers were also somewhat "out" in their original estimate of structure weight, but the greater proportion was due to B.O.A.C.'s demand for changes in requirements.

On the subject of performance (coupled with absence of airfields), the conclusion is reached that it would be difficult to justify operation east of Calcutta and south of Nairobi unless the tare weight could be reduced, or flight refuelling were adopted, or B.O.A.C. were to reduce its most stringent standard of operation.

When the Courtney Report was submitted, the Tudor II had not been sent to Boscombe Down for tests, but these have now been made, and the Ministry of Supply announces that a preliminary analysis shows the results to be unexpected and disappointing.

FOOD QUEUE: Avro Yorks employed on the Berlin air lift being unloaded on the tarmac at Gatow airport. These twenty-one aircraft have an aggregate disposable load of over 650,000 lb.

DESFORD In the Air

Renewed Acquaintance with a Popular Basic Trainer Design

By Wing Cdr.
Maurice A. Smith, D.F.C.

Illustrated by "Flight" Photographs

Unusual wide-span ailerons, hinged behind the wing trailing edge; give the impression of full-span flaps. Aileron control is particularly light and effective. Note the pick-up points for the long-range belly tank beneath the centre section.

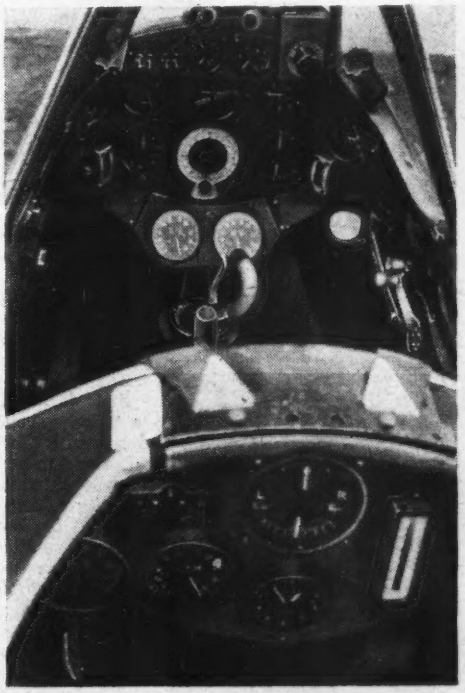
IT is a great pity in more ways than one that the Reid and Sigrist Desford could not have been ordered as an R.A.F. trainer. Experiments during the war with the prototype three-seat *Snargasher*, from which it was developed, indicated that interesting results might well have been obtained from the employment of such a twin-engined basic trainer for combined elementary and early advanced instruction. The majority of duties now required of the latest basic trainers such as the Prentice are within the Desford's capacity, although no third seat—a provision of very doubtful value—is available. However, such ruminations are past history, and the Desford in trainer form is remembered as an attractive proposition with some excellent flying characteristics. The existing machine may shortly be employed on important research work which gives added purpose to this appraisal from a pilot's point of view.

One fact worth mentioning at this juncture is that two Gipsy Major engines giving a total of 260 h.p. are cheaper to buy and operate than one 205 h.p. Gipsy Six or 250 h.p. Gipsy Queen 30.

A detailed description of the machine was given in our January 24th, 1946 issue, but to recall the principal features, it may be mentioned that it has a two-seat tandem cockpit with single bubble-type sliding canopy, and is powered by two close-in Gipsy Major engines. Construction is of wood, landing wheels are fixed, twin fins and rudders are fitted, and the all-up weight is 3,300 lb. Provision is made to carry a long-range tank under the belly, and equipment at present includes electrical inter-com., fixed camera in the nose, full blind-flying panels, and a skid indicator for deck landings. In addition V.H.F. radio can be carried.

On the occasion of my flight, typical Midland weather prevailed. A strong cold wind was blowing; there was full cover of cloud, some showers and indifferent visibility. In addition, I was feeling the after-effects of Deauville. In spite of all this I formed a very favourable impression of the highly manœuvrable little Desford which has a character all of its own.

The cockpit is snug when the enclosure has been wound forward and the heater turned on. All controls come to hand conveniently, and field of view is first class—as, of course, it should be. Taxying with the differential use of throttles, aided by powerful air-operated brakes with lever on the spade grip, is simple and effortless. Springing is rather hard, and, due to the short fuselage, there was a tendency to buck on the uneven grass surface of Desford airfield. The main legs and wheels are, in fact, a great deal more sturdy than necessary.

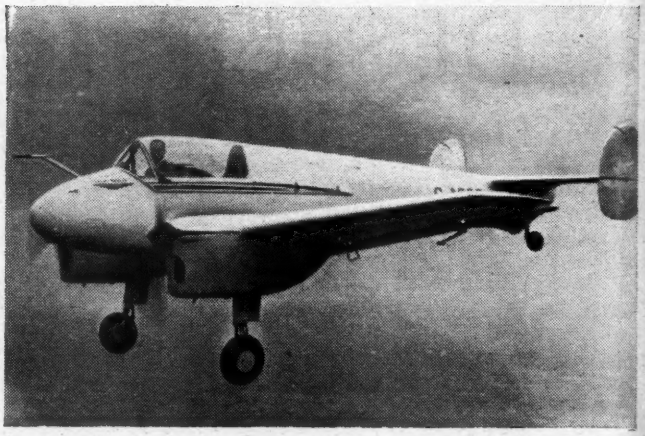


Instruments and controls are grouped in a practical manner around the standard blind flying panel. A skid indicator and camera controls may be seen among the more familiar equipment.

For take-off, a few degrees of flap may be selected if desired. Pneumatic operation is employed, and any angle can be selected at will. The flap lever and throttles are interconnected to select automatically the maximum lift position if, with flaps down, throttles are opened wide for an overshoot. Directional control on the ground is very good and, if need be, both throttles can be opened wide at once, rudder being used to check any slight swing tendency. The take-off run, flying solo, was in the region of 150 yards, and initial climb settled down at a good 1,000ft/min. Coarse-pitch wooden airscrews are fitted at present, and best climbing speed is about 90 m.p.h.

On becoming airborne, the sweetness of aileron control became apparent at once. The aspect ratio is high and the surfaces are very light and effective in operation, giving an exceptionally good roll performance. They are hinged behind the wing trailing edge in a rather unusual manner. By comparison, rudder

Desford in the Air . . . . .



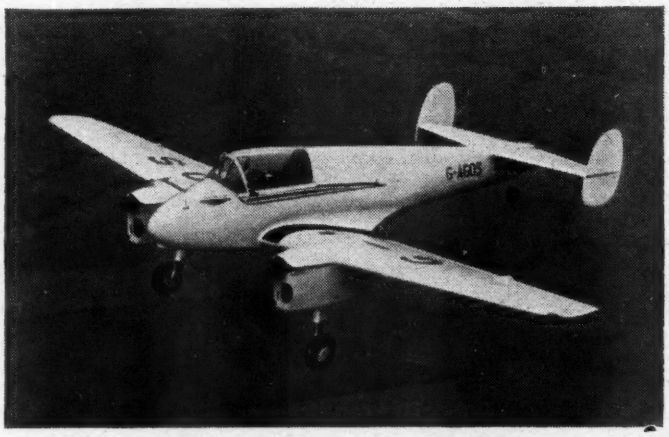
The Desford's sturdy fixed undercarriage and pitot head mounted as a sight for level flight are shown in this photograph. Mr. J. A. Hart, the Company's test pilot, is flying from the front cockpit.

and elevator controls, though good, are quite heavy, and those who value harmonization highly might regard this as a slight weakness. Personally, I have no objection on this type of aircraft when all three controls are light even if in varying degree.

Single-engine Performance

Directional control with one engine idling is remarkably good and critical single-engine speed is hardly distinguishable from stalling speed. The Desford will climb slowly on one engine at heights up to about 2,500ft, and it will hold height at 3,000ft. If the dead engine could be stopped, which might be possible in some cases, performance would, of course, be better. Turns can be made readily in either direction with one engine cut. The stall, which occurs at around 53 m.p.h. with flap down, is as gentle as anyone could wish, and only after prolonged straight sink does a wing offer to drop. The flap-up stall commences at about 60 m.p.h. I.A.S. Recovery from a spin, which after one turn becomes smooth and steep, is positive and rapid.

One rather unusual feature, which makes itself felt when trying the stall or on steep turns and certain aerobatic manœuvres, is a warning shudder at about 15 m.p.h. above the normal stalling speed. If a steep turn is held after this turbulence around the tail is felt, speed can be allowed to drop to a figure at least 10 m.p.h. lower before the true stall occurs. Thus, it is not apparently a normal high-speed stall occasioned by high loading in the manœuvre. A similar manifestation accompanies the over-the-top portion of a loop.



A feature of the Desford is its neat one-piece moulded enclosure. Field of view is first class from both cockpits.

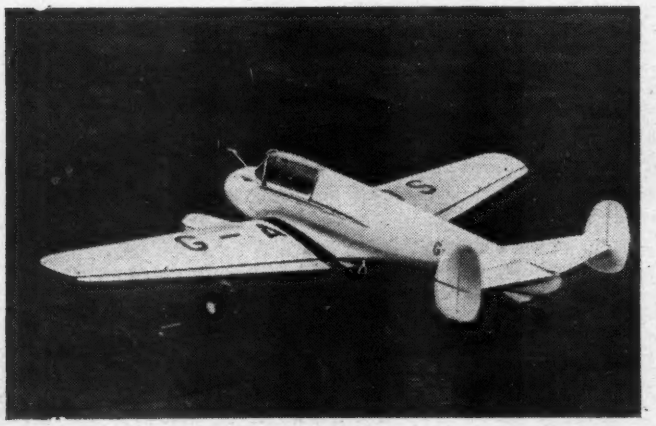
Aerobatics call for no special remarks. All recognized manœuvres can be executed with ease, including a climbing roll. Rolls are more comfortable if slightly barrelled, and the speed should be about 140 m.p.h. Loops can be made from 150 m.p.h. upwards, and for rolls off, about 165 m.p.h. seems sufficient. Care must be taken to avoid over-revving of engines in the dives.

As an aid to straight and level flying, the pitot head is mounted on a long arm on the fuselage nose. It acts as a horizon sight and is most useful as such. Normal cruising speed is around 125 m.p.h. indicated, at 3,000ft. The skid indicator is another potentially useful gadget which, by causing one or other of two red lights to wink at the pilot, indicates occurrence and direction of skid, or, according to the position of an accompanying control, skid in excess of a pre-set number of degrees.

When approaching to land, some flap may be lowered at not more than 100 m.p.h. and a good steep final approach can be held at 80-85 m.p.h., a trickle of power and three-quarters to full flap being desirable. The Desford will side-slip well if need be, and this would be a useful characteristic in the unlikely event of a forced landing being necessary with this fixed-wheel twin.

For landing, a gentle round-out brings one easily into three-point attitude, and from that position the pilot has little feel except with regard to direction. When ready, the aircraft gives a small shudder and "plops" firmly down.

As one would expect, an overshoot presents no problems and the automatic part-raising of flap is effective. Slight change of trim occurs with the raising and lowering of flap; up causes nose-down moment, and vice versa.



In plan view the Desford looks most attractive. The outer wings have straight taper and 5 degrees of dihedral.

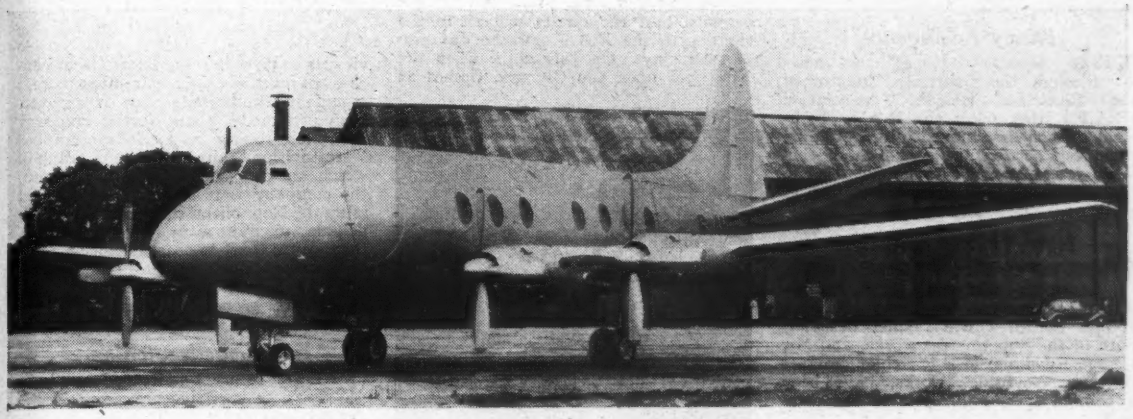
In its two and a half years of flying the Desford has proved very easy to maintain and its condition is still excellent. The designer,

Mr. G. Bower, paid particular attention to the servicing aspect of the aircraft, and detachable panels are provided at all appropriate points. For example, there are fourteen inspection covers in all on wings and fuselage for examination of the push-rod control system. The crash-proof fuel tanks are mounted on the hinged doors which give access to their compartments and they may thus be swung open for inspection. Engine cowlings can be removed entirely without disturbing the airscrews, and both nose and tail portions of the fuselage are detachable.

Reid and Sigrist test pilot, Mr. J. A. Hart, flew the Desford for the accompanying photographs.

MAKERS DATA FOR THE REID and SIGRIST DESFORD
Two D.H. Gipsy Major Engines.

Span	34ft
Length	25.5ft
Height	8.1ft
Wing Area	186 sq. ft
All-up Weight	3,300lb
Wing loading	17.75lb/sq. ft
Power loading	12.7 lb/h.p.
Max. speed	160 m.p.h.
Cruising speed	140 m.p.h.
Fuel capacity	44 gallons
Range	460 miles
Climb	1,100 ft/min
Service ceiling	17,700ft



The Viscount prototype, showing the slim nacelles for the Rolls-Royce Dart turboprops.

Another British First

Initial Flight of Vickers Viscount with Transport Turboprop

A REMARK by Captain J. Summers, Vickers' chief test pilot, that the new Viscount transport, powered by four Rolls-Royce Dart turboprop units, is "the smoothest and best" machine he has ever flown, can well be believed. He commented in this vein after landing from the initial flight of the Viscount prototype on July 16th, having been airborne for some 20 minutes.

Features of the Viscount—the world's first airliner to be driven by turboprops—were discussed in *Flight* of November 20th, 1947, and the latest technical data, relative to both the Dart and Naiad-powered versions, appear on this page. Planned from the outset as a successor to the Viking, the Viscount can be arranged as a 32- or 36-seater. In the former case the cabin is divided into two saloons, the forward seating 12, and the aft seating 20, passengers. Between the saloons is the pantry. A large door is provided at each end of the cabin, and adjacent to each door is a cloakroom for clothing and hand baggage. There are two toilet compartments, one at each end of the cabin. Provision is made for a crew of four, including a steward, and for full radio and navigational aids.

With the exception of the extreme tail and nose-wheel housing the entire fuselage is pressurized to a differential of 6½ lb/sq in. This pressure maintains ground level conditions up to a height of 15,000ft.

It will be seen in the accompanying photograph that the cabin has large elliptical windows, the Vickers technical staff having found that an elliptical hole requires the smallest weight replacement to make an effective seal for a pressurized fuselage. A single reinforced member around each window has proved adequate. Another unusual feature, considering the civil nature of the aircraft, is the form of the pilot's cockpit enclosure, resulting in an unusually wide field of view, despite pressurizing.

In the Viscount Great Britain possesses a medium airliner of exceptional promise. Due to the adoption of the Ambassador by B.E.A., however, no decision has yet been made concerning production.

The Viscount is one of a number of new civil aircraft scheduled to appear at Farnborough during September.

VICKERS VISCOUNT DATA

	Power Plant: Dart	Power Plant: Naiad
Dimensions		
Span	89ft 0in	89ft 0in
Length	74ft 6in	74ft 6in
Height	26ft 3in	26ft 3in
Wing area	885 sq ft	885 sq ft
Weights		
Normal all-up weight	40,500 lb	43,500 lb
Empty or basic	27,450 lb	27,700 lb
Disposable load	13,050 lb	15,800 lb
Landing weight (maximum)	39,000 lb	39,000 lb
Loadings		
Wing loading	45.75 lb/sq ft	49.1 lb/sq ft
Capacities		
Fuel	1,200 gal.	1,200 gal.
Oil	14 gal.	14 gal.
Performance		
Maximum speed	331 m.p.h.	370 m.p.h.
at height	20,000ft	25,000ft
Recommended cruising	276 m.p.h.	316 m.p.h.
at height	20,000ft	25,000ft
Rate of climb at sea level	1,675 ft/min.	1,850 ft/min.
Rate of climb at sea level (one engine stopped)	950 ft/min.	1,150 ft/min.
Service ceiling	30,000ft	30,000ft
Take-off to 50ft (minimum) at maximum weight	950yds	950yds
Landing from 50ft (minimum) at maximum weight	900yds	900yds
Still-air range	1,725 miles	1,725 miles
at height of	20,000ft	25,000ft
Fuel Consumption		
Cruising consumption	192 gal./hr.	220 gal./hr

HERE AND THERE

Flight-refuelling for B.S.A.A.

A. V. ROE, LTD., are at present fitting flight-refuelling equipment to a B.S.A.A. Tudor. This will enable the aircraft to take on over a thousand gallons of petrol at the rate of about one hundred gallons per minute while flying at nearly 300 m.p.h.

Enemy Intelligence

FROM Germany comes the news through the Quarterly Bulletin of the Electrical Officers' Association (R.A.F.), that when the R.A.F. Technical Branch first moved into a building previously occupied by part of the Focke-Wulf design staff they were surprised to find copies of *Flight* dating from 1913 to early 1945 neatly filed away!

New Vickers Directors

VICKERS - ARMSTRONGS, LTD., announce that Mr. A. E. Marsh-Hunn, commercial manager, and Mr. Joseph Smith, C.B.E., chief designer, both of the Supermarine works, and Mr. George Edwards, M.B.E., chief designer of their Weybridge works, have been appointed special directors of the company.

Avro's Mission to Australia

MR. C. J. WOOD, London manager of A. V. Roe and Co., Ltd., and Mr. D. C. Wood, projects department, left London by air on July 9th on a liaison mission to Australia. They are re-establishing contact with the firm's Australian agent and are obtaining first-hand information on air activity and potential markets there.

Royal Navy At Home

AN opportunity of inspecting some of the Navy's latest aircraft, aboard the aircraft carrier H.M.S. *Implacable*, will be afforded to Plymouth visitors during the August Bank Holiday Naval Days. The fleet will be "at home" to the public from July 31st to August 2nd, both days inclusive, at Portsmouth, Plymouth, Chatham and Sheerness, and until August 1st at Rosyth. At Portsmouth the aircraft carrier H.M.S. *Theseus* will be among the ships on view, and it is hoped that a light fleet aircraft carrier will be added to the list of ships at Rosyth.

1948 Olympics

MR. GEOFFREY DE FREITAS, Under-Secretary of State for Air, opened the Olympic Centre at the R.A.F. Camp at Uxbridge on July 7th. The visiting athletes will live in airmen's barracks which have been redecorated by the airmen themselves specially for the occasion and the guests will share the camp with the R.A.F. for the duration of their stay. On July 29th, when the King will open the Olympic Games at Wembley an English runner will enter the stadium carrying the traditional lighted Olympic Torch. These torches, of which High Duty Alloys have made 1,600 are carried by runners from Olympia, Greece.

VERY HIGH DUTY: The Hiduminium die-cast bowl of this Olympic torch carries the symbol of five entwined circles and is inscribed: "Olympia to London, 1948." Naphthalene pellets provide the flame and the complete torch, eighteen inches in length, weighs only 3 lb.

K.L.M.'s New Engine Test Shop

THE new engine test shop recently completed at Schipol airport by K.L.M. was designed by Heenan and Froude, of Worcester, in co-operation with the airline company and the Amsterdam municipal authorities. It contains two large engine tunnels and all the subsidiary plant necessary for the complete ground testing of modern, high-powered engines, both air- and liquid-cooled, of either British or American manufacture, up to 4,000 h.p. Great care has been taken to reduce noise and vibration to a minimum and engines can be tested at reduced pressure simulating altitude conditions.

Airborne Television Relay

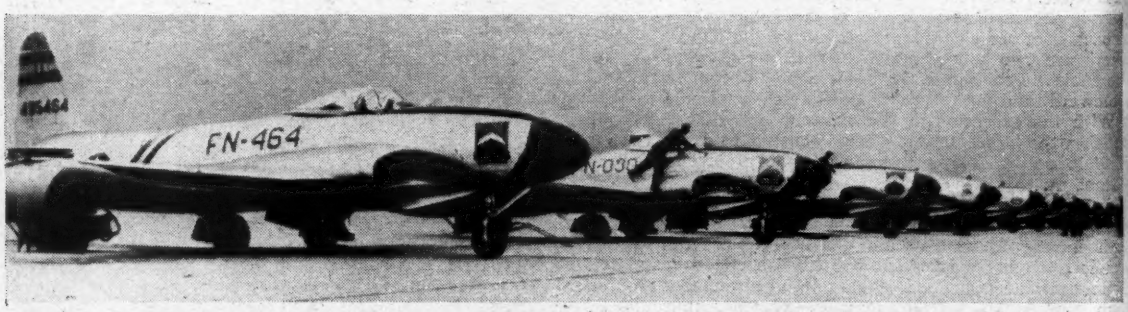
AN "airborne" method of relaying television which will enable viewers to pick up programmes from hundreds of miles away instead of the present 50-mile maximum range, has, it is stated, been perfected by an electric company in Ohio. Using a specially equipped "stratovision" aircraft, a photograph of which was published in *Flight*, July 8th, the company were able to pick up and relay the Republican convention in Philadelphia, 360 miles away. By this method, they claim, coast-to-coast television could be provided much earlier than forecast, and the service could be conveyed to areas that ground systems could not reach.

Radioactive Iodine

THE first radioactive isotope ever to be flown from Baltimore was recently carried from there by B.O.A.C. to Bermuda, where it will be used in experiments involving thyroid gland research. The radioactive material, known as Iodine 131, was sent to Dr. S. A. Mathews, of the Bermuda Biological Station. Radioactive iodine will be tested on parrot fish which are peculiar to Bermuda and are considered to be most responsive to this type of research. The shipment, weighing about 40 lb, was officially listed as one millicure of radioactive iodine 131. In all, ten millicures will be flown to the Bermuda Biological Station by B.O.A.C. in consignments of a millicure each.

American Stall Indicator

THE Safe Flight Instrument Corporation, of New York, has produced a stall indicator in which the warning light and horn operate in the pilot's cockpit at approximately 5 m.p.h. before the stalling point of the aircraft to which the device is fitted. The "detector" is mounted low down on the leading edge of the wing and consists of a small projecting vane which, so long as the air is flowing over it normally, remains in the



TRANSATLANTIC BOUND: A flight of United States Air Force Lockheed F.80 Shooting Stars lined up at Selfridge Field, Michigan, prior to taking off for England. Bad weather caused some delay en route and two of the machines were held up for power plant adjustments. Flying by way of Goose Bay the aircraft completed the 714-mile leg there from Bangor, Maine, in 2 hrs. 8 mins. As reported elsewhere the first transatlantic flight by jet planes was recently made by R.A.F. Vampires from this country.

HERE AND THERE

"safe" position. If, however, due to the approach of a stall, turbulence at the lower portion of the leading edge reverses the position of the vane, the warning devices in the cockpit are brought into action.

Model Engineer Exhibition

THIS year's Model Engineer Exhibition will be held at the New Royal Horticultural Hall, Westminster, between August 18th and 28th, and will be open to the public between 11 a.m. and 9 p.m. In addition to jet-propelled models which will be displayed for the first time, a steam locomotive railway, workshops and test benches will be on show for the inspection of the public.

Naval Bombing Trials

OLD warships of the Royal Navy and ex-enemy navies are being used as targets in trials aimed at discovering the detailed results of explosion shock, both from direct hits and near misses. In this way valuable knowledge for the design of the Royal Navy's ships of the future is obtained. Bombing trials with H.M.S. *Nelson* as target which have been conducted during June are continuing, and much valuable information has been obtained in relation to both ships and bomb design. Underwater explosion trials have been carried out with both British and foreign ships in Loch Striven. The two famous British destroyers, *Jervis* and *Ashanti* are now serving as targets in these trials before going to the ship-breakers.

Exchange of Test Pilots Proposed

THE Minister of Supply, Mr. G. R. Strauss, was recently asked in Parliament by A. Cdre. Harvey how many Americans had been attached to the R.A.E. for instruction on the Test Pilots Course and how many British pilots had received similar instruction in the U.S.A. Mr. Strauss replied that since the war seven Americans had attended the course which, though it used the R.A.E.'s airfield, was run by the Empire Test Pilots' School. No facilities for similar instruction existed in the U.S.A., he added. A. Cdre. Harvey continued by asking if Mr. Strauss was aware that the Civil Aeronautical Experimental Station in America would be very pleased to see British pilots there for instruction. Mr. Erroll then asked for a transfer of pilots as suggested by A. Cdre. Harvey.

MERLIN BALLIOL: The Boulton Paul Balliol fitted with a Merlin 35 engine photographed as it taxied out for its first flight on July 10th. It was flown by one of the company's test pilots, Mr. Peter Tisshaw.

News in Brief

A Westland-Sikorsky helicopter recently landed on the flight deck of H.M.S. *Implacable* whilst the aircraft carrier was steaming at speed. The flight was made to despatch urgently needed spares for the Westland Wyvern which is at present undergoing deck-landing trials.

* * *

American Overseas Airlines have appointed Mr. W. Thomas, London District sales manager, to be assistant European sales manager. Mr. K. Leach has been appointed district sales manager, U.K., in succession to Mr. F. S. Leib, who has moved to New York.

* * *

The first meeting of the newly formed branch of the Society of Licensed Aircraft Engineers at Northolt was held on June 6th. Mr. D. W. Richardson, chairman of the Society, gave a talk on the aims of the society. The committee of the new branch is under the chairmanship of Mr. I. J. Gregory.

* * *

Two of Tasman Empire Airways flying boats the *Aotearoa* and *Awarua*, are being sold at Auckland, New Zealand, and a number of prospective buyers want to convert them into dwellings. One idea was to use them as a petrol station with the hulls serving as office accommodation, and the petrol pumps beneath the wings.

* * *

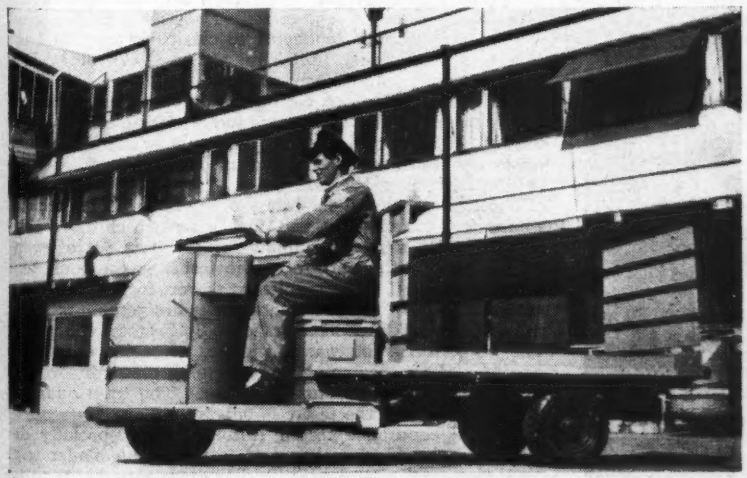
An air display will take place at the R.A.F. airfield, Woodvale, on July 24th between 1300 and 1700 hours G.M.T. Aerobatics and formation flying up to 4,000 feet and parachute descents from a captive balloon up to 500 feet will take place within a radius of 5 nautical miles of the airfield only if Visual Flight Rules are in force. Pilots are advised to avoid flying in the vicinity at the times stated.

* * *

A school teacher and sexton in a small Swedish village whose hobby is the study of storks, after seeing in an air travel agency a map of the migration routes of these birds, entered the agency to make further enquiries. The *Svenska Dagbladet*, on hearing of the teacher's interest, invited him to make a study flight to South Africa. He accepted and left Amsterdam recently in a K.L.M. DC-6 to follow in the wake of his favourite birds.

* * *

Aero Research, Ltd., have produced a new synthetic resin adhesive named "Araldite" for bonding metals, glass, porcelain, china and other materials. Araldite sets under the application of heat alone and no hardener is required. After curing, the joint is claimed to be impervious to boiling water and all common organic solvents. It is available in the form of powder or rods, and information can be obtained from the makers at Duxford, Cambridge.



BRUSH PONIES: Seen in front of the airport buildings at Copenhagen is a Brush 2-ton Pony industrial truck. A fleet of these vehicles is being used to carry passengers' luggage and other freight to and from aircraft using the airport. They are manufactured by the Brush Electrical Engineering Co., Ltd.

FIVE HUNDRED HOURS

Remarkable Endurance Test of Bristol Theseus Turboprop

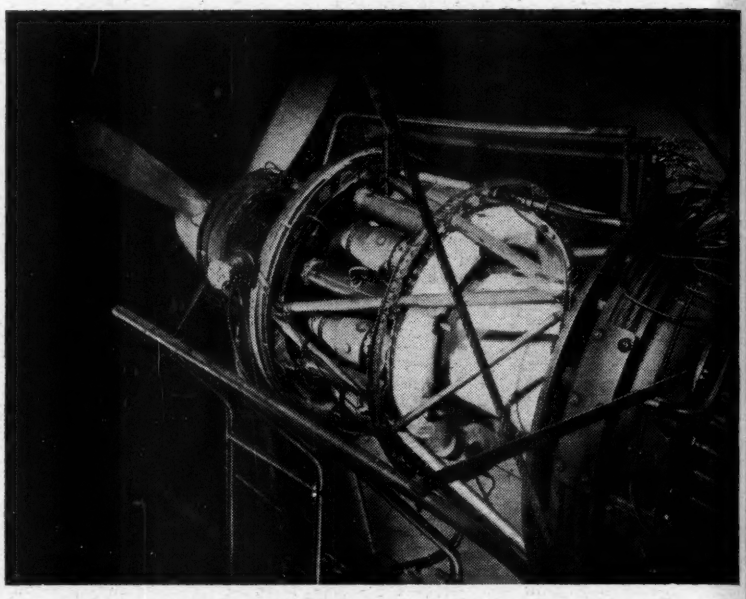
HISTORY was made at Filton when, on July 13th, a Bristol Theseus turboprop unit on a test stand was stopped for the last time. By then it had completed a "sealed" endurance test in the course of which it had run for a total of 500 hours under the independent control of and observation by representatives of the Air Registration Board. This very remarkable feat demonstrates the reliability which this particular unit has already achieved, and serves as an indication of the low maintenance cost which gas turbines may be expected to incur when put into service.

On July 8th we recorded the "half-time score" of the Theseus test. At the end of the first 250 hours, temperatures and pressures were normal, and the fuel consumption was of the order of 0.65 lb/b.h.p./hr at full power and 0.70lb/b.h.p./hr. at 75 per cent power.

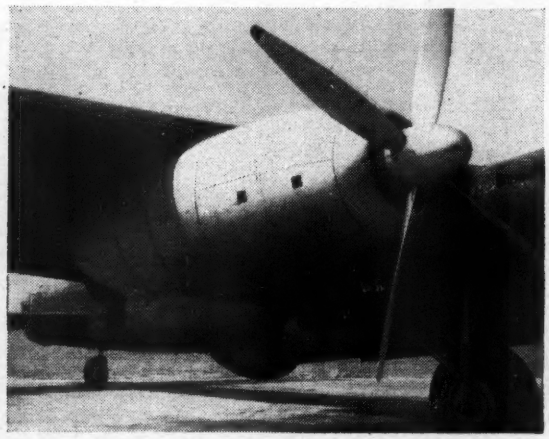
The test began on June 19th and covered a total lapsed time of 567¼ hours, of which the engine was running for 500 hours and scheduled stops accounted for 60¼ hours. The conditions of the test were such as to preclude any servicing beyond the minimum inspection requirements.

Some idea of the strenuous nature of the test may be formed from the following data. The total of 500 hours comprised 34 periods of 5 hours' duration and 33 periods of 10 hours' duration. These periods were made up as follows:—

	Total b.h.p.
5 hours at take-off power	2,250
50 hours at max. continuous power ..	1,675
100 hours at 70 per cent of t.o. power ..	1,560
100 hours at 65 per cent of t.o. power ..	1,450
100 hours at 60 per cent of t.o. power ..	1,340
100 hours at 55 per cent of t.o. power ..	1,230
45 hours of miscellaneous running, including 67 starts (hot and cold) and 1,000 accelerations.	



SPOTLIGHT ON RELIABILITY: *The Bristol Theseus photographed during one of the stop periods in its 500 hr. run.*



FLIGHT DEVELOPMENT: *This photograph of a Theseus installed as an outboard power unit of an Avro Lincoln shows its excellent lines when close cowled.*

Between successive 5- and 10-hour cycles, the engine was shut down for a period of not less than two hours to give a cold start for the next cycle, and for not more than 15 minutes to give a hot start. In all there were 25 two-hour stops and 41 stops of 15 minutes maximum. All maintenance was completed within the scheduled stop periods, and they merely comprised visual inspections, with burner spray nozzles cleaned at each 100 hours and igniter plugs changed at each 150 hours. Two sets of igniter plugs were used, the intention being to clean one set while the other set was in use. Actually, although the plugs were inspected, no cleaning was necessary.

During the whole 500 hours, the only component which had to be replaced was a starter motor, which was changed during the scheduled stop at 315 hours. The motor had made 160 starts and had already seen considerable service before the test was begun.

Throughout the whole test the engine gave no trouble whatever. It ran night and day, with two shifts of testing personnel, and was running for 10 hours out of every 11. A noteworthy feature of the test was the consistent power developed. The maximum power, for instance, was within 20 h.p. of the average over the full 500 hours. Fuel consumption at take-off averaged 0.85 lb/total b.h.p./hr. The oil consumption was negligible, averaging 0.25 pints per hour at the beginning and dropping gradually to give a final average of 0.2 pints per hour. The total quantity of oil used during the test was only 12 gallons.

For the endurance test a Rotol airscrew specially designed for the Theseus was used. It is a four-blader with duralumin blades and of 13ft diameter. Much attention has been paid to weight reduction, and the airscrew weighs only 377 lb, or 0.17 lb/h.p. based on take-off power. The airscrew had previously passed a 100-hr type-approval test on the Theseus.

Civil Approval for the Ghost

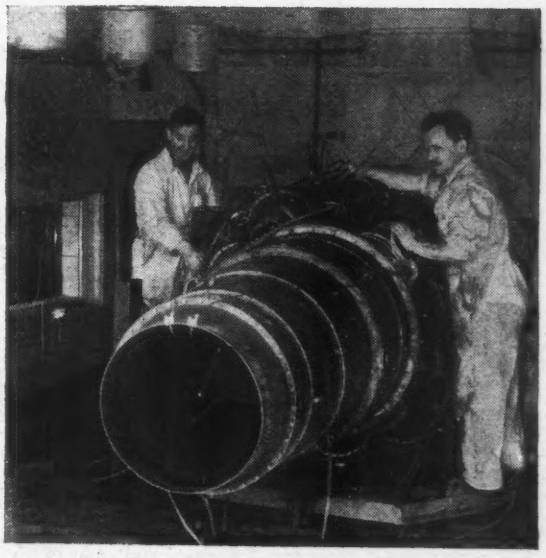
The D.H. Comet Advances Through Another Development Stage

FOLLOWING in the footsteps of the Goblin, its smaller relation which was the first turbojet to receive Service approval, the de Havilland Ghost turbojet has now become the first in its class to obtain full A.R.B. approval for civil operation. The test necessitated a 150-hour run under very arduous conditions, and the purpose was to prove the durability of the unit as a part of its intensive development programme in preparation for installation in the D.H.106 Comet.

Many thousands of hours of flight development have been completed by the Ghost in the Lancastrian test bed and in the Ghost-Vampire. Together these two aircraft have enabled high- and low-speed investigations from ground level to nearly 60,000ft to be made.

The main components of the test Ghost had run for more than 100 hours before the approval run was commenced. The rating established is of 4,450 lb static thrust, with an overhaul period of 250 hours subject to an agreed inspection schedule. In the following months, in the next stage of development, the aim will be to increase durability and at the same time bring the approved thrust rating up to the designed 5,000 lb.

It is well known that the de Havilland company favours the single-sided impellor, direct-entry type of turbojet. In connection with the Ghost installation, they point out that icing dangers are minimized by this type of air intake, and that the absence of a plenum chamber, or the need to pass air around the engine, permits a simple and light cowling, and also enables the hot and cold sections of the engine to be separated within the cowling by fireproof bulkheads.



The D.H. Ghost during its 150-hr civil type-test run.

The importance of the 500 m.p.h. Comet airliner and its Ghost power units to the future of British airlines cannot be overestimated. The passing of this gruelling civil engine type-test is an encouraging indication of continued satisfactory progress towards a first flight in 1950.

THE BERLIN AIR LIFT

BOTH the Air Minister, the Rt. Hon. Arthur Henderson, and Lord Tedder have been to Germany to watch the Berlin air lift in operation. On his return the Air Minister gave a Press conference with A.V-M. Hardman, Assistant Chief of Air Staff, Operations, in attendance. Mr. Henderson revealed that from June 29th, when the lift started with some 50 Dakotas, until noon on July 15th, 2,461 loads had been flown into Berlin.

To take the increased traffic, a new airfield has been constructed at Fassburg in the British Zone, and a runway lengthened at Gatow. The Gatow runway, extended to 2,000 yards, was expected to be in operation by last week-end. Although he gave the number of loads arriving in the city, Mr. Henderson refused to quote the number of aircraft employed on the lift. Servicing is proving to be somewhat of a problem, but a certain amount of it is being done in Britain and the remainder on the Continent. Reserve air crews and ground crews are being sent to Germany as they become available but more are still wanted, especially for the Yorks. All Transport Command's scheduled services to the Middle and Far East have been cancelled in order to divert aircraft to Germany, and B.O.A.C. is taking over these commitments.

As is the case whenever or wherever the Royal Air Force has a real job in hand, morale is extremely high. Mr. Henderson, in answer to a question from *Flight's* representative, made the definite statement that "winter will not ground the R.A.F." Nevertheless, there is, during the winter, abundant Q.B.I. in the area of the corridors.

The Air Minister was careful to emphasize the fact that nothing like the peak had been reached, nor had air traffic at Gatow reached saturation point. It was also stated at the conference that the employment of Bomber Command aircraft had been considered but not so far adopted. The Air Ministry, the same evening, went further stating that final arrangements were being made to use Lancasters and Lincolns.

The Russians, in their endeavour to make the air lift as difficult as possible, announced that aircraft of the Russian Air Force would be carrying out exercises over the areas covered by the corridors and also that the whole question of air corridors would have to be reconsidered. As a reply to the former, British jet fighters are being held in readiness to escort the transport aircraft in case the Russians interfere with them. Regarding the latter, G/C. H. M. S. Wright, of the Air Branch of the Control Commission has said that there appears to be very little the Russians could do to alter the present four-power arrangements and that even if an attempt was made to lay down new regulations they would not be recognized as rules by any of the other Powers.

Over last week-end some sixty U.S.A.F. Superfortresses arrived in Britain, ostensibly on a training flight. It has not been stated whether they will join in the air lift, but these, together with another 30 of the same type already in Germany, would be a valuable addition to the aircraft already being used by the Americans. In addition a further 70 Skymasters are on their way to Germany, making, in all, 130 C-54s.

As we go to press the average number of loads taken each day into Berlin amounts to about 500, of which some 215 are flown by the R.A.F. About 2,250 tons of supplies per day, including coal, are now reaching the beleagured city, but General Clay, the U.S. Military Governor, has said that the air lift could be "stepped up to 5,400 tons a day and continued at that figure indefinitely."

Marshal of the Royal Air Force Lord Tedder's visit was more directly concerned with the welfare of R.A.F. personnel engaged in the operation than the air lift itself. Accompanied by Lady Tedder and Air Marshal Sir Arthur Sanders, Commander-in-Chief British Air Forces in Germany, the C.A.S. was met at Gatow by A. Cdre. R. N. Waite, head of the British air branch in Berlin, and G/C. B. C. Yarde, Officer Commanding Gatow Airport. Later the British Military Governor, General Sir Brian Robertson, landed for a short talk.

NO GARDEN PARTY

OWING to the many events scheduled for this summer the council of the Royal Aeronautical Society has decided not to hold its annual garden party this year. For the last two years this event has been held in conjunction with the S.B.A.C. displays, but this year it was not possible to do so at Farnborough, and it appears likely that next year the R.Ae.S. Garden Party will be held, as before the war, independent of the S.B.A.C. display, and probably early in the summer.

Comfort in the Air

Useful Range of Furnishing Items Now Standardized by Vickers : Electrically Operated Chairs : Food Container Units

(Left) The Type IV chair with mechanical adjustment. The tray rests on disappearing cantilever supports projecting from the armrests. (Right) A Miles electric actuator adjusts the angle of the Type I. Controls are on the armrest.

VICKERS-ARMSTRONGS, LTD., are a company the scope of whose interests is enormous, and it is but natural that within any one division a wide diversity of interest should be found. The aircraft section has, for a long time, produced a large range of standard fuel cocks, but the accessory field has recently been widened to include such items of equipment as aircraft seats, galley fittings, power controls, etc.

There was no specific intention to enter the sphere of seating manufacture; it really started off with the Viking. When these aircraft were sold to various customers, differing seating specifications were presented, and the company found that, in order to meet the several requirements, they had to design and manufacture a variety of seat types. It was decided to devote a design section to this field, and the present state is that a series of standard designs have been established, but, of course, special requirements can also be met.

Chair Designs

To complement the standard Viking fixed chair, a four-position adjustable version has been standardized into a modified form of the B.O.A.C. design, which had its origin in the old Imperial Airways chair. Adjustment is provided by levers in each side valance, moving in four-notch gates, with spring-loading furnished by bungee elastic cord. Cantilever brackets are extensible from each arm rest to carry table trays. The weight of this chair installed complete is 35 lb.

A good-looking chair which provides a high degree of comfort—it is designated Type IV—also incorporates mechanical adjustment; in this case release of the locking catch is effected by a press-button in the arm rest. This chair also features extensible cantilever supports for a tray table. There is, in addition, a fixed version, which is given the designation Type III, and what is called a "siesta" version is also being produced.

This latter is intended to provide for sleeper accommodation in passenger aircraft with the maximum comfort and the minimum penalty in respect both of weight and space. The back of the chair can be raked back to 28 deg from the horizontal and, with a seat pitching of only 48 in, an extremely comfortable sleeping position is given, with the occupant's legs tucked under the back of the chair in front; a light, comfortably padded leg rest is extended forward from the seat cushion when the chair is used for sleeping. The normal Type IV chair weighs 30 lb, whilst the Type III (fixed) version weighs 29 lb. The siesta version of the Type IV weighs 34 lb. In addition to these weights are 0.5 lb for the lifebelt container, 0.57 lb for the ashtray and 1.14 lb for the tray table.

One of the most luxurious chairs produced by Vickers is the Type I electrically actuated model. This chair is quite superbly comfortable, and by appropriately turning the knurled rim of a small thumb-wheel projecting through one of the arm rests, a Miles electric actuator is energized to adjust the angle of recline. The installed weight of this seat complete is 33.21 lb. By no means in the same class of luxury, although providing very comfortable seating, are the paired, fixed chairs designed as standard for the Vickers Viscount 32/43-passenger aircraft.

A considerable range of galley equipment is standardized, this, too, having grown from the yalley furnishing on the standard Viking aircraft. All the items are made of specially polished, non-corrodible Birmabright, whereby light weight and considerable strength are combined. The fact that the several items are capable of being nested does not necessarily impose any one type of arrangement, and, in fact, the galley structure can be designed to suit individual requirements in order to cater for the varying space conditions in different aircraft.

The B.O.A.C. four-position type chair which weighs approximately 35lb. complete with table.

Among the items of galley equipment in standard manufacture is a beaker stowage unit in the form of a pair of slotted tubes, each of which will contain twenty-four beakers, the unit weight being 1 lb 15 oz. A galley and sink unit, comprising draining top, sink, splash panel, cutlery drawers, pillars and kick strips, with height, width and depth dimensions respectively of 46½ in, 51 in, and 24½ in, has the extraordinarily low weight of 10 lb. A kitchen waste container, the lid of which is operated by a pedal, is built with sealed seams to prevent leakage of liquids; a height of 14 in, width of 11 in and depth of 7½ in give the container adequate capacity and the weight is 1 lb 14 oz.

Glass Stowage

A stowage for twenty-four ⅓-pint glasses and twelve ½-pint glasses, of goblet type, provides some neat design features. The glasses are stowed in an inverted position and are secured in spring grooves by the base of each glass. Recesses in the spring plates accurately locate the glasses in relation to the stowage and to each other, so giving adequate protection against damage and shock. A sliding gate, which can be located in either of two positions, is provided for security. The weight of this unit is 7 lb 2 oz.

An equally important item of galley equipment is the food container unit, an insulated cabinet into which fit eight trays. Runners are fitted to the top and bottom of each box so that they may be stowed one above the other, the number per aircraft varying according to the number of passengers to be catered for. The cabinets are rapidly secured in position in the galley by means of locking eyes and spring-loaded pins, and an "Artif-ice" unit can be fitted in place

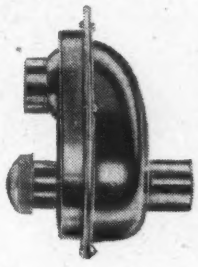
of one of the eight normal trays in order to maintain the original freshness of the food packed. The design of these food containers is such that a complete set of used containers can be replaced by re-provisioned ones to ensure a quick turn-round. Each cabinet has a capacity of 3.75 cu ft, and the weight is 12 lb 6 oz.

The liquid refreshment side of galley provisioning is catered for by a wine and spirit stock container with a capacity of five 1-pint bottles of spirit, twelve soda or ginger ale bottles, and up to twenty bottles of cordial. For security purposes, all the compartments can be sealed by the use of a single padlock.

Silent Ventilation

A component which Vickers have devised as a further contribution towards the efficiency and comfort of passenger accommodation is a silent louvre for ventilation. The conventional punkah louvre does the job required of it, but the manner of the doing is open to improvement; so often, when perhaps in a cabin furnished with twelve louvres, ten may be shut, the blast of air from the remaining two open units may be somewhat violent and extremely noisy. The new silent louvre does away with these disadvantages. It is quite simple and consists merely of a small chamber into which the ventilation air is delivered, the airstream impinging on to a circular felt pad, whence it is distributed evenly round the chamber and flows into the cabin through a normal hemispherical-type director nozzle. The felt pad, in addition to acting as a distributor face for the air entering the louvre, also serves to damp any noise in the airstream, and also, by rotation of a knurled knob, acts as a closure face to blank off the air supply.

Toilet fittings are also included in the Vickers accessory range. A lavatory pump unit, designed as a self-contained installation, provides the novel feature of a foot-operated pump. The pump unit is a separate entity from the pan unit, and although both units are available as a complete installation, they can, of course, be obtained separately to suit individual requirements. Two useful accessory items to the lavatory unit are provided in a binette and towel cabinet. The binette is intended for the reception of waste which might otherwise be disposed of in the lavatory pan, the height, breadth and depth of this item being, respectively, 12in, 12in, and 6in, and the weight 1 lb 14 oz. The towel cabinet is a receptacle unit both for clean and soiled towels and has its upper surface dished to form a tray for such personal effects as rings, watches, etc. The soiled towel compartment is ventilated from beneath and the dimensions are 21in in height, 13in in width and 4in in depth. In common with the units previously described, these last-mentioned components are made of polished Birmabright.



Ventilation is knob controlled in the Vickers silent louvre.

The accessory design section is now based at the Vickers-Armstrongs South Marston establishment near Swindon, where, too, the manufacture of accessories is undertaken. South Marston was built as a shadow factory during the war, and was taken over as a satellite to, and administered from, the company's Castle Bromwich establishment in April, 1943. In April, 1946, it became the new home of Vickers-Armstrongs Supermarine, Ltd. The shops and hangars provide floor space of 450,000 sq ft., which is increased to 560,000 sq ft by the inclusion of the offices, etc., these buildings being adjacent to an airfield of 600 acres provided with two runways, the more important of which is capable of further extension.

South Marston Developments

One of the considerable difficulties with which the company is faced at South Marston is the lack of housing accommodation in the immediate area. However, the Swindon municipal authorities are very helpful in this respect, and so soon as further accommodation can be provided, more people will be transferred from the Southampton area. South Marston is, at the moment, administered from the present Supermarine headquarters at Hursley Park, some fifty-five miles away, and although the eventual intention is for South Marston to be made a complete entity, it will be some considerable time before Hursley Park is closed down.

Some of the developments in hand at South Marston include the hydraulic actuation of fuel cocks, and the development of hydraulic "fuses" of instantaneous cut-off and metering type. A ¾in B.S.P. three-way fuel cock has been developed for light aircraft and has recently passed the A.R.B. requirements for such a unit; it weighs ¼ lb.

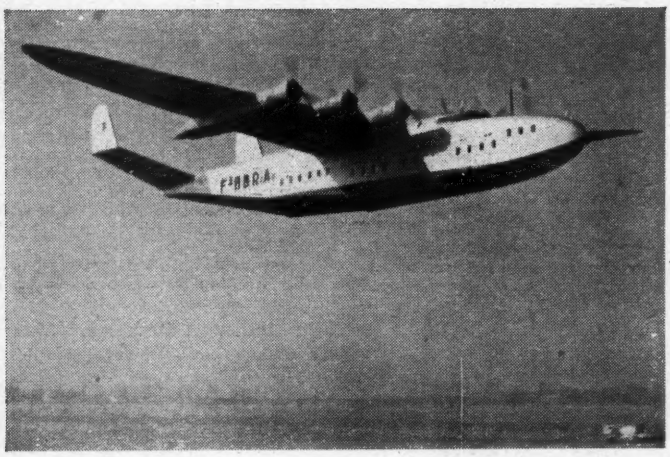
ON THE SPOT

ONE has now become accustomed to successful landings in difficult places by helicopters. A new note was struck last week, however, in connection with the Mechanical Handling Exhibition at Olympia. The official garage adjoining has a flat roof, and it was a foretaste of air-taxi service between terminal airports and exhibition buildings of this character that a twelve-minute passage was made between Croydon and Olympia bringing four passengers, who might have been overseas visitors to the exhibition. A Westland-Sikorsky S51 was used.

"Flight" photographs.

Alan Bristow landing the Westland Sikorsky S51 on the roof of Metropolis Garages, and (above) showing that he was on the dot.

One of the extraordinary things about the alighting on the roof was the fact that on a small boarded section less than half the size of a tennis court, three circular black spots had been introduced, and there were many incredulous people when it was announced that the pilot would put his wheels down on the spots indicated. Actually, Alan Bristow, that past master of Westland-Sikorsky helicopter demonstrations, made a perfect landing with an all-up weight of about 5,000 lb, his wheels pin-pointing on the spots indicated. The demonstration was arranged with Westland Aircraft, Ltd., of Yeovil, by Mr. L. F. Dyer, the managing director of Metropolis Garages, Ltd., in conjunction with Mr. Geoffrey Smith, director of Associated Iliffe Press, publishers of *Mechanical Handling* and *Flight*, and was watched by a large and influential group.



NATIONALIZED AIR FRANCE

A Summary of Post-war Operations and Present Constitution of the French National Airline

One of the six Latécoère flying-boats which operate on the Air France South Atlantic route. Three are undergoing refitting to accommodate more passengers but with less accommodation for sleeping.

LA SOCIETÉ AIR-FRANCE was constituted in 1933 as a company with mixed interests conforming with the regulations made in December, 1932, which governed the activities of private companies engaged in civil aviation. In 1941 the company was placed under the double control of the Ministry of Civil Aviation and the Ministry of Economic Affairs, but after the liberation it was decided to nationalize air transport. On June 26th, 1945, the activities of Air France ceased to be governed privately with the publication of an ordinance transferring the stock ownership of the Company to the State. The Government to-day owns 60 per cent of the Company's capital stock and all of the profit-participating shares. The remaining 40 per cent is not all in private hands since Corporations and Associations in which the Government have a voice hold a large proportion. Air France is thus, to all intents and purposes, Government owned and controlled, with the Minister of Public Works and Transport exercising the control jointly with the Company's directorate. It is the responsibility of the Minister to determine which routes are to be covered and the frequencies of service. As is implied in Nationalization, the Exchequer subsidizes development and covers any deficiencies on the year's operation, but it is clearly stipulated that Government aid must be progressively reduced until the Company becomes self-supporting. The amount of subsidy was 800,000,000 francs (about £1,000,000) in 1947 and little change is expected in the amount for 1948.

Operations in 1947

It is impossible to draw up a precise balance sheet for 1947 as some of the equipment ordered by the company and not yet invoiced, was purchased on terms depending on rates of exchange. Another difficulty is that a portion of the aircraft now being used by the company were acquired by the Ministry of Air and have not yet been transferred to the company. Actual flying costs in 1947 were 54.98 per cent of the total expenses for running the airline, as compared with 66.46 per cent in 1938. Expenditure on non-flying services increased from 43.54 per cent in 1938 to 45.02 per cent in 1947. Passenger receipts increased from 33.97 per cent in 1938 to 73.72 in 1947. Such an increase may be explained by the far greater passenger capacity of the aircraft now being flown by Air France and the opening of new passenger services coupled with the wider appeal of air travel to the public. Similarly, the freight carried in 1947 was eight times greater than that carried in 1938. In 1947 commercial receipts (5,290,000,000 frs) actually covered total expenses (6,310,000,000 frs) in the proportion of 83.84 per cent, and a comparison with the previous year (75 per cent) and with 1938 (40 per cent), 1937 (38 per cent) and 1936 (29 per cent) suggests that Air France may be progressively approaching financial self-sufficiency.

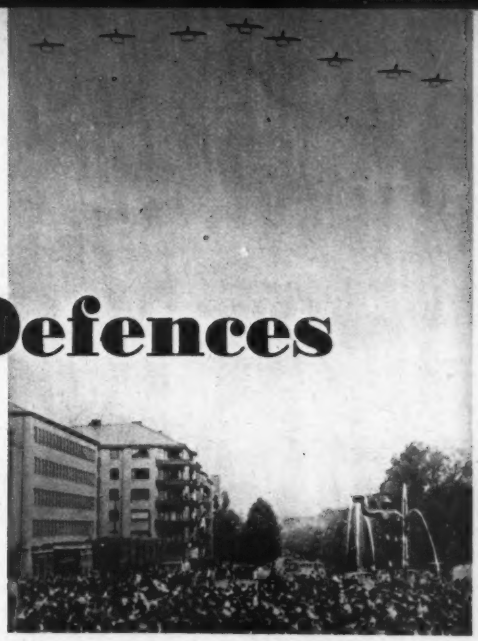
Air France now has a fleet of modern aircraft types providing a carrying capacity almost double that of the previous year. At present the fleet numbers 176 aircraft, of which 108 are in active use, 26 are temporarily out of service, and 42 are held in reserve. The total is made up of the following types: 13 Constellations, based at Orly for the North Atlantic and South Atlantic routes; 19 DC-4s, based at Orly for the East African, West African and Far Eastern routes; 36 DC-3s, of which 13 are based at Le Bourget, 4 at Perpignan, 6 in Central Africa, 5 in the Far East, 6 at Le Bourget for training purposes, 40 Languedocs 161s, the majority of which are based at Le Bourget for the European network, 4 for training, 9 in North Africa; 37 Ju. 52s, used for feeder services overseas, and practically superseded. There are 6 Latécoères based at Biscarosse for the Antilles service, of which three are in use and three undergoing refitting; three Catalinas, based on Fort de France, for the Antilles-South American mainland service; three de Havilland Dominies, none of which are in use; 15 Caudron 449s, of which six are used for training, eight not in use, and one in reserve; five Bloch 221s and two Nord 1002s, these last being held in reserve. The term "reserve" includes aircraft on delivery or undergoing modification.

Recent Expansion

The company has 946 persons engaged on flying operations and 8,646 ground staff. Flying staff include 306 pilots, 232 radio operators, 214 flight engineers, 23 navigators, 29 pursers, 70 air hostesses, and 81 stewards. On the ground there are 91 persons engaged in direction and at the managerial level, whereas 1,086 are employed on administrative duties, 1,780 on sales, 793 on operational duties, 4,255 in technical and maintenance work and the balance in various occupations. During 1947 Air France carried 428,000 passengers over a route system of 212,595 kilometres. Like the British Corporations, the French national airline is obliged to run non-paying services to Dominions and colonies, and to compete with other companies on numerous external services both in Europe and elsewhere. In 1947 the company was running 87 services as compared with 24 in 1938. Thus, with expenses 15 times greater than they were in 1938 in actual value of francs the commercial receipts were increased 34 fold, and with ten thousand employees to run the vastly expanded organization as compared with 4,150 in 1938 the results for 1947 may be said to have been about eight or nine times better.

The 1948 summer schedules which came into operation in June include the introduction of a non-stop service from London Airport to Nice in 3¾ hours with connections by road to Cannes, Monte Carlo and Mentone. Services between London and Paris have been increased from four to six daily. A direct non-stop service has also been introduced between Glasgow and Paris and on all these routes 33-seater 4-engined Languedocs are now flying. The service between Manchester and Paris cannot be operated with Languedocs until Ringway airport has been extended to accommodate larger aircraft, and in the meantime daily services are being flown with Douglas D.C.3s. In addition Languedocs are flying regularly from Paris to Rome, Milan, Venice, Basle, Geneva, Zurich and Lisbon, and to Algiers and other important French towns in North Africa, whilst daily services fly to Amsterdam, Brussels, Prague, Warsaw and Copenhagen. In addition to these scheduled services by Air France, other companies are flying subsidiary services on behalf of the national airline, from Gatwick to Dinard and Caen, and from Croydon to Deauville.

Last month Air France introduced Lockheed Constellations on the route to South America and the outward journey between Paris and Buenos Aires is flown in 30½ hours instead of 36¾ hours, and the return schedule is being reduced from 45 hours 5 minutes to 39 hours 20 minutes. The actual flying times will be 26 hours outwards and 34 hours 20 minutes homewards. Time on the ground totals 4½ hours when flying west and 5 hours is spent in refuelling at Casablanca, Dakar, Recife, Rio de Janeiro and Montevideo on the eastward flight.



By Wing Cdr. Maurice A. Smith, D.F.C.

Sweden's Air Defences

Impression Following a Visit to a Swedish Squadron : Vampires in Service and for Training

SWEDEN is at present engaged in re-equipping, regrouping and reorganizing its Air Force. A single generation has seen a complete change in outlook forced upon this small, advanced and cultured nation by the development of aerial weapons and as a result of the late war. A common border was shared with Norway; a friendly Germany and Denmark faced the populated southern areas of Sweden across the narrow stretches of the Baltic and Kattegat, while in the far north mountain, forest, snow and darkness were effective defence against invasion. Now the old natural defences count for little, Germany counts for even less, and Finland is something of a question-mark in the North. Therefore, it has seemed to Sweden that if she is to be ready to meet any threat to her independence, the time has come to concentrate on building up a powerful defensive air force.

The recent Swedish defence estimates are indicative of the country's attitude towards air defence. 125 million kroner are voted for new supplies for the Air Force, 45 million kroner for the Army and 20 million kroner for the Navy. An additional 15 million is also voted for Naval artillery of the coastal defence type. Thus, the sum voted for the Air Force equipment is greater than the combined total for the Army and Navy. Plans provide for the conversion of Västmanlands (F1) medium-bomber wing to night-fighter duties, and the Ostgöta (F3) tactical reconnaissance wing to day fighters. The Roslagens (F2) wing, which was also engaged on tactical reconnaissance, is shut down. The torpedo-bomber wing at Blekinge (F17) is to become an attack wing. The total resources are ten day-fighter wings, of which three are to have a 50 per cent strength increase; one night fighter wing; a strike force of four wings; and one reconnaissance wing. In addition, an Air Force radar school is to be founded.

First and most important units to receive attention are the fighter squadrons and fighter O.T.U.s which are now equipped with J21s, J22s, Mustangs and Vampires. Seventy Vampires were ordered in January, 1946, and all had been successfully flight-delivered by August, 1947. A new order for Vampire 3s has since been placed, the extent of which is secret, but the Goblin engines for which will be built under licence in Sweden. The production of these engines will give Svenska Flygmotor Ab valuable experience in preparation for production of Ghosts for the latest Swedish fighter design, the J29, and for turbines of their own design. Most of the J22s (a Swedish single-seater with home-built Twin Wasps) have now been replaced, and the J21 order has been completed. The later jet variant, the J21Rs, are just going into production to provide Sweden with a second Goblin-powered interceptor and ground attack aircraft.

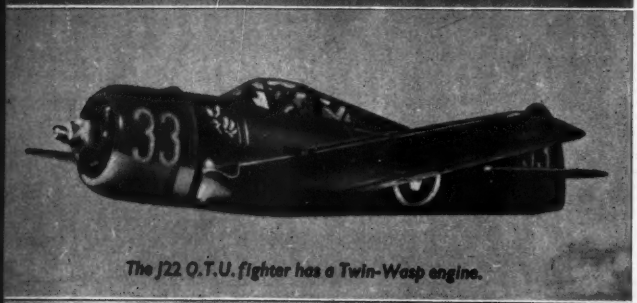
Variants of the twin-engine B18 are used for medium-bomber, reconnaissance and strike duties, and this design, resembling the Mosquito, would be a valuable all-rounder in emergency.

Air Force Administration

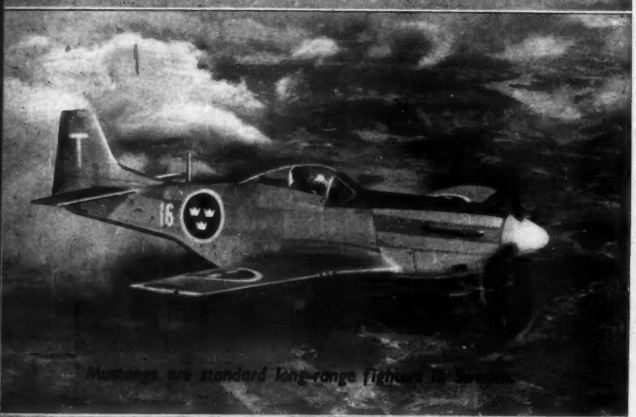
The Swedish Royal Air Force has existed as an independent force since 1926, and the Commander-in-Chief is Lt.-Gen. B. G. Nordenskiöld. He is subordinate only to the Supreme Commander of the Swedish Armed Forces. Under him is the Royal Air Board of which he is the senior member, and which undertakes many of the duties, such as the ordering of aircraft, engines, and equipment, and the maintenance of airfields and buildings, which are the responsibilities of our Ministry of Supply. The deputy chief of the Royal Air Board, Maj. Gen. N. O. F. Söderberg, may be regarded as the counterpart of our Controller of Supplies (Air). There is also an Air Staff of which Col. G. A. Westring is the chief, and in which there are departments similar to the directorates under our own Chief of Air Staff. These are for control of operations, training, organization, signals, personnel, accident prevention, meteorology, staff, and

Vampires must be operated from snow-covered fields for many months of the year.

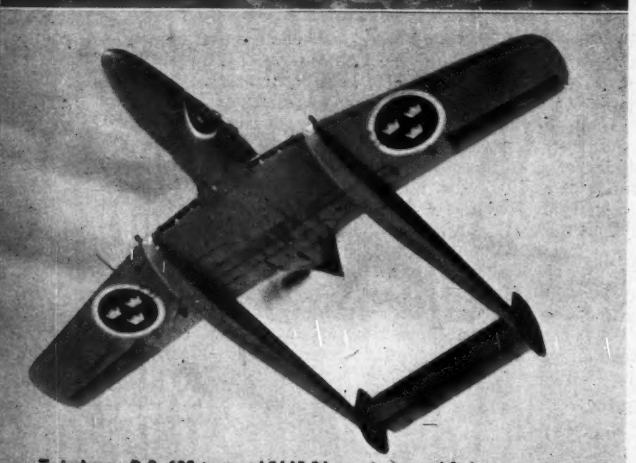
SAAB 18B used for bombing and reconnaissance duties.



The J22 O.T.U. fighter has a Twin-Wasp engine.

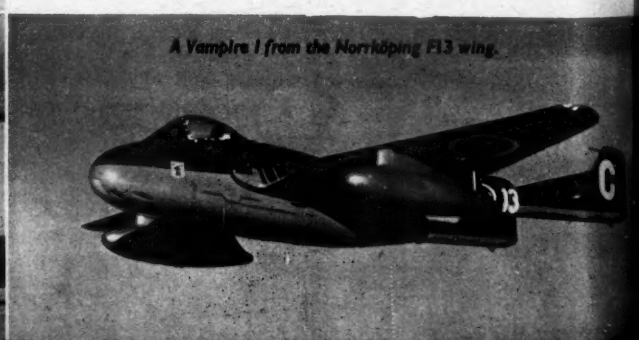


Mustangs are standard long-range fighters in Sweden.



Twin-boom, D.B. 600-powered SAAB 21s equip several fighter squadrons.

First Swedish-built jet fighter is the 21R with Goblin turbine unit.



A Vampire I from the Norrköping F13 wing.

Sweden's Air Defences . . . . .

public relations. Finally, there is the medical section, and a civil department dealing with legal and financial matters.

Internal reorganization of units in the Swedish Air Force is now in progress. Day- and night-fighter strength is being increased, in some cases by 50 per cent, and for night-fighter experience several Mosquitoes are to be purchased, complete with suitable radar equipment. These will be sent to the night-fighter wing which will be based at Västerås.

It is thought in Sweden that the next machine to be designed by S.A.A.B. may be either a ground-attack aircraft or a night-fighter. With economy in mind, as it must always be in a small country, the possibility of producing a basic twin-engined aircraft capable, with a difference of engine, equipment and armament, of doing both jobs, is being considered. If this can be done without impairing the efficiency of the machine in either role, it would be of great importance.

For the first time an Air-Sea Rescue Squadron is to be formed in the near future.

Of the various prefixes and names it is useful to know that a Swedish Flygeskader is the equivalent of a Group, an Air Division of a Squadron, and a Flottilj of a Wing. J stands for jakt, or fighter, B for bomber, A for attack, S for spaning or reconnaissance, Tp for transport, Sk for training, and P for experimental.

Training Syllabus

Flying training programmes are undergoing some alteration at present, and as a result future Vampire pilots will handle jet aircraft after completing training up to the equivalent of O.T.U. standard on Bücker Bestman and Harvard aircraft. From tabular details of old and new schemes at the top of page 100, it will be seen that until now pupils have completed 300 hours' flying in a little over two years before going on to operational aircraft. In this time is included 80 hours on an obsolete piston-engined fighter which remains, nevertheless, a good O.T.U. machine. Under the new scheme, pupils will do only 200 hours before going on to Vampires, J22 experience being omitted.

The 40 hours on Harvards flown after posting to the Vampire Wing, F13 flottilj at Norrköping, are provided to enable the pupils to become familiar with the countryside and airfield, and conversant with local procedures. A pupil is thus enabled to give his full concentration to flying during early Vampire hours without worrying about position, runway, etc. At this period, as during earlier training, a co-ordinated programme of ground lectures is given.

There is nothing about the flying of Vampires that should trouble 200-hour cadets. Range or endurance, and the possibility of losing position due to the speed at which ground is covered, are things to be watched. It will be noticed that Vampire experience starts in the early summer, when weather in Sweden is generally excellent for flying. This is arranged deliberately and in normal circumstances pupil pilots do not have to fly a Vampire in bad weather until they have 50 or more hours on the type in their log books. Early flights are restricted to good weather, and a maximum of half-an-hour's duration.

Experience in instrument and bad-weather flying conditions does, however, start at about 20 hours and is conducted by a shepherding instructor flying nearby and in radio contact with the pupil, who wears special goggles with restricted vision for the practice.

Vampires with long-range tanks, on exercises at Kallax airfield, Lulea, in the far North of Sweden.

During a visit (unfortunately unavoidably short) to F13 Bråvalla Field at Norrköping, I saw and learned a great deal about this unit under the guidance of Col. Naeslund, the commanding officer. I was impressed by the extremely pleasant quarters for the officers, N.C.O.s and men, and by the friendly, but respectful relationship between pupils and staff officers. The officers' mess has some delightful rooms, much more reminiscent of a country house than military quarters, and the members must be very proud of their home. I fear that it would not remain in the same condition for long in R.A.F. or U.S.A.A.F. hands.

Unit organization is shown simply in tree form below. There are several considerable differences between this and the corresponding R.A.F. system. Each flying squadron is quartered in four small hangars, and there are separate squadron messes or hostels for the corporals and the airmen. Since Vampires arrived, the grass of the airfield has suffered, and runways and an enlarged tarmac area are being laid.

Concerning Pay and Service

Some disconnected items of interest are that each division (squadron) has staff officers, pupil cadets if a nursery squadron, and N.C.O.s. The lowest flying rank is corporal, and there is an extra Swedish N.C.O. rank between corporal and sergeant. The P/O. equivalent is Fänrik, and his basic pay, subject to income tax, is about 500 kroner (£35) a month (14.40 kr to the £). By comparison, an *ab initio* pupil starts at 90 kr a month, plus the universal flying allowance of 270 kr a month, and after ten months this has risen to 150 kr. A cadet receives on an average 285 kr, while a ground staff flight sergeant with ten years' service gets about 630 kr. There is the usual provision of clothing or an allowance, and a small station location allowance.

Promotion is automatic up to captain in seven years from commissioning, with retiring age of 50 years. More senior rank is attained on merit, and the retiring age is higher. There are no acting ranks in the Swedish Air Force.

All F13 Vampires carry their squadron colour on the nose-wheel cover and letter on the tail booms. In addition, they carry the Norrköping city crest.

Reverting now to the operation of Vampires, these aircraft have not so far been used for ground attack, although the new order for low-tail Mk IIIs will make available aircraft of a type used for that purpose in the R.A.F. It is probable that Vampires and 21Rs will be tried out side-by-side on ground attack duties to discover if either is more liable to snaking, and which at high speed is the more solid and steady platform for gun firing. In this connection it is of interest to record that some people in Sweden are of the opinion that rockets have not necessarily superseded the large-calibre cannon for attacks on armoured vehicles and the like. This is, perhaps, not surprising in the country producing the Bofors gun.

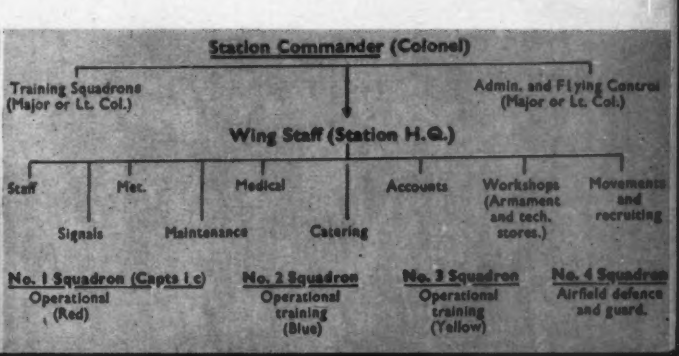
As an interceptor, the Vampire appeals in many ways to Swedish pilots. Its comparatively long range enables it to fly from southern airfields to the northern territories in one hop, and so be ready for action in little more than two hours. Range is also important in view of the widely separated airfields in Sweden. It is within the capacity of the Vampires to fly non-stop from Hatfield to a suitable Swedish airfield.

An important part of the regular training programme are the winter exercises in the far north. This February four flights of Vampires moved up from F13 to F21, Kallax field, at Lulea. In this area snow may be up to 6 ft deep, and outside temperature varies from zero to −40 deg C. Clear and intensely cold air are ideal operating conditions for the Goblin, but starting, indirectly, and the maintenance of clear runways present considerable trouble.

Gas turbines are, on the whole, better off than large piston engines for starting. Only a small oil system needs to be heated up, and there is no trouble with condensation or fuel mixture. However, more power is needed to turn a gas turbine on starting up, hot or cold, and accumulators do not take kindly to sub-zero temperatures. The alternatives (in addition to the various types of engine oil heaters, all of which are being tried out and studied) are accumulators with a heating device, a petrol generator set, which by the act of charging keeps the electrolyte warm, or direct connection of the generator to the engine starter.

Clearing of runways is a major problem and must be tackled in a big way by a fleet of snowploughs, bulldozers, snow-slingers, scrapers and rollers. Pilots who have operated Vampires from these ice runways surprisingly enough report little or no trouble. The jets melt the snow which at once refreezes and this leaves a very slippery surface, inconvenient to man and machine. Brakes are

The officers' mess at Norrköping differs strikingly from R.A.F. counterparts.



In the absence of air transportation, supplies must travel in this picturesque but slow manner in the far north of Sweden and in Lapland.

Sweden's Air Defences . . . . .

practically useless but with plenty of room provided, there have been no accidents through overshooting or hitting the snow banks edging the runways. Sanding and chipping (scarifying) of the runways improves the surface from the safety point of view.

Forced landings on Vampires have been a subject of particular interest to Swedish pilots. Fortunately Goblin engine failures are virtually unknown, so discussions have been chiefly academic. While ice and snow remain on the innumerable lakes in Sweden, wheel-up landings on these natural flats could be made with little danger or damage, but in the summer an engine failure would be a most serious thing. There are relatively few airfields, and clear level spaces hardly exist at all. The fields that do exist in the south are nearly all small, uneven and usually contain several huge rock boulders. A belly-landing would thus be very hazardous indeed.

Baling Out and Ditching

There are no known reports of a pilot getting out of the Vampire. To fit an ejector seat now would be a major operation, if possible at all, and to get clear without one would be ticklish to say the least. A quick jab forward on the stick, having jettisoned the canopy and turned on to one's back, would seem to be the most promising method.

Another question that is asked is whether or not a Vampire ditches well, and again no information seems to be available. If, in fact, a safe ditching is possible, the lakes would once more provide the forced-landing areas.

On the whole, Vampires have been operated very successfully by the Royal Swedish Air Force, and the few small troubles which have been experienced have been, or are being, rectified by the de Havilland company. Principal among them are the cracking of cockpit canopies and undue wear in certain nose-wheel oleo leg components. In all, four canopies have failed at heights between 25,000 and 35,000 ft—all, fortunately, without injury to the pilots. A later design of canopy is now available. A Swedish engineer officer expressed the hope that the time between combustion chamber inspections for the Goblins would soon be lengthened from 30 to, say, 50 hours. It is a compliment to both aircraft and pilots to record that after many months of operation of their first jet fighters, 69 Vampires out of the original 70 are still flying.

The problem of canopies misting-up—experienced on many types of aircraft—is being tackled, and at present "Gnomist" glycerine-base anti-mist transparent sheets are applied to the inside surfaces of the canopies, as they have been and still are in this country.

Close collaboration between the British and Scandinavian Air Forces is of the greatest importance to each one. The presence of many Service pilots, particularly in Norway and Sweden, who received their training in, or who have operated with, the Royal Air Force during the late war, assures ties of friendship and understanding, and has effectively removed language difficulties. Exchange visits by squadrons, such as have recently been taking place (No. 16 Mustang squadron was welcomed at West Malling, and R.A.F. Hornets from No. 65 Squadron visited Sweden) are to be encouraged, and will ensure continued co-operation.

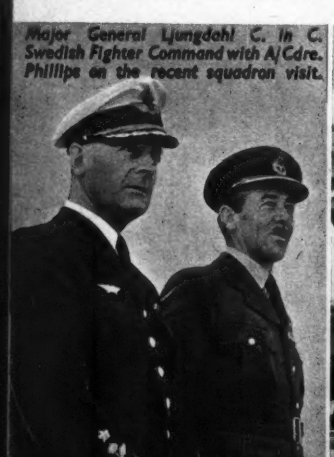
A compact new mobile petrol heater with fan circulation, for aid in starting engines in sub-zero climates.

Current Training Scheme.

June 1947	110 hr Bestman 50 hr Harvard		Pupil pilot—no rank.
May 1948	160 hr		
	40 hr Harvard 80 hr J22 (O.T.U. fighter)		Corporal
May 1949	120 hr		
	40 hr Harvard 80 hr operational fighter		Cadet—equiv. to Corporal plus
May 1950	120 hr		
	300 hr total to Vampire standard.		

New Scheme for Vampires.

1st Year (approx. same months as above)	100 hr Bestman 60 hr Harvard	
	160 hr	
2nd year	40 hr Harvard (with Vampire Sqn.)	
	200 hr total to Vampire standard.	



Major General Ljungdahl C. in C. Swedish Fighter Command with A/Cdre. Phillips on the recent squadron visit.

Colonel Westring, Swedish Chief of Air Staff is shown a visiting R.A.F. Hornet by F/L. Russum of No. 65 Sqn.

Colonel Naeslund O.C. Norrköping, and Lt. Geijerstam, his adjutant, of F13 Flottilj.

CIVIL AVIATION NEWS

FORMATION TAKE-OFF: An exclusive and unusual photo of a flight of five B.E.A. helicopters taking off from Yeovil airfield. The three aircraft nearest the camera are Westland-Sikorsky machines and the two distant aircraft are Irvin Bell helicopters. The former is being used for the B.E.A. helicopter mail service, referred to in "Flight," June 10th, which opened in co-operation with the G.P.O. on June 1st.

New Airline and Commercial Pilots' Licences Proposed : I.C.A.O. Conference at Seattle : New York Airport Contracts

G.C.A. AT LONDON AIRPORT

DURING the first year of the operation of radar-controlled landings at London Airport, which was completed on July 1st, a total of 2,184 Ground Controlled Approaches to land have been carried out. About half of these were normal operational services and the remainder were practice landings. It is a rule of the Corporation's that all captains of aircraft, no matter how experienced, on positioning flights from the Corporation's maintenance base at Hurn, Hants, must make practice G.C.A. landings on arrival at London Airport.

PROFESSIONAL PILOTS' LICENCES

NOTICE TO AIRMEN NO. 255 gives details of the new professional pilots' licences which it is proposed to introduce later in the year. The new categories and qualifications are in accordance with the recommendations made by the International Civil Aviation Organization, and will be introduced when the necessary legislation has been passed.

In place of the existing pilots' licences Class "B" there will be three classes: Commercial Pilot's Licence, Senior Commercial Pilot's Licence, and Airline Transport Pilot's Licence, and as the new licences are introduced the issue of the old "B" Class will cease. There will, however, be an interval of time to allow existing licence holders to comply with the requirements for the appropriate new licence. In addition, the new regulations will require pilots when flying under Instrument Flight Rules to possess an Instrument Rating. Such a requirement will be brought into use as soon as practicable after the new regulations have been introduced, and will be the subject of a new Notice to Airmen.

Examinations for the new types of pilots' licences will not start before October 1st this year, and in order to give licence holders ample opportunity to qualify for the senior commercial or airline transport pilot's licences applications for renewal of "B" and second class navigators' licences current on the date on which issue of the new licences begin will continue to be entertained at their ordinary dates of renewal up to the end of next year. Such licences will entitle holders to exercise the same privileges as hitherto until they finally cease to be valid. Special arrangements will be made for those pilots who, as the new regulations come into force, already hold "B" licences and are qualifying for second class navigators' licences. They will be able to obtain the higher professional licences in a provisional form pending full qualification for Instrument Rating.

The Commercial Pilot's Licence will permit the holder to fly under Visual Flight Rules as pilot in charge of any public transport aircraft not employed on regular airline services and not exceeding 12,500 lb maximum total authorized weight, and under Instrument Flight Rules if he also holds an Instrument Rating. He may not fly as pilot in charge carrying passengers by night unless within the previous 90 days he has made five night take-offs and landings. Applicants must be not less than 18 years of age, with 200 hours' experience as pilot, including certain conditions. Ground examination will be of approximately the same standard as for the present "B" licence, but there will be additional examinations in Flight Operation and in Visual Morse reception. Applicants will also be required to pass a medical examination and flying tests. Each licence will bear an endorsement or series of endorsements indicating which particular type of aircraft he is entitled to fly as pilot in charge and as second pilot. Such endorsements will be dependent upon passing the appropriate technical, operational and flying tests on the type concerned. These licences will normally be valid for six months and renewable at similar intervals subject to medical examination and proof of recent flying experience.

Privileges attached to the holders of the Senior Commercial Pilot's Licence, subject to the necessary type rating, include the permit to fly under V.F.R. and I.F.R. as pilot in charge of any public transport aircraft not exceeding 15,000 lb and of any public transport aircraft not carrying passengers which do not exceed 30,000 lb and on any aerial work aircraft, and also as second pilot in all conditions. The applicant must be not less than 21 years old, with 700 hours' experience, of which 200 hours must be as captain, with several other particular conditions. Ground examinations will be similar to existing 2nd N., with examinations in Flight Operations and flying, with the necessary Instrument Rating.

Highest category of all is the Airline Transport Pilot's Licence, which will entitle the holder to fly as pilot in charge or second pilot of any aircraft under V.F.R. and I.F.R. conditions. The applicant must be not less than 21 years and must have 1,200 hours' flying experience, including 100 hours night flying and 250 hours as captain, with certain conditions. The ground examination will be approximately the same standard of the Second Class Navigators, with the exception of Met. and Operation, which will be to first N standard.

Instrument Rating endorsement will permit the holder to fly as pilot in charge or as second pilot under I.F.R. All applicants must be holders of valid pilots' licences and have carried out 150 hours as pilot in charge and not less than 40 hours' instrument flying. Examinations will include the

Civil Aviation News . . . . .

following subjects except in so far as any applicant has already qualified in the course of obtaining a Commercial Pilot's "B" Licence or one of the navigator's licences: Aviation Law, Flight Operation, Air Navigation, Meteorology and Signals. The applicants will also be required to pass flying tests and the Instrument Rating will remain valid indefinitely, subject to the passing of a periodical flying test. Examinations in flight operations will contain questions on flight planning and the safe operation of aircraft.

In an Appendix to the Notice to Airmen there is a provisional table of exemptions for current licence holders from examination requirements for new professional pilots' licences. Applicants for the Senior Commercial and Airline Transport Pilot's licences will have to qualify for an Instrument Rating by satisfying examiners that they can fly by instruments only and can land in poor visibility, using S.B.A. and G.C.A. It will later be illegal for any pilot to enter a Control Zone under I.F.R. conditions unless he has an Instrument Rating. The commercial pilot who is not required to hold Instrument Rating will undergo in the course of his training at least 10 hours' instruction in the air in the use of instruments and will take the new examination which includes aircraft instruments.

Regulations for the licensing of private and student pilots will be published at a later date, but it is understood from the Association of British Aero Clubs that the cost of obtaining the licence will not be affected. New conditions will require a total of 30 hours' flying dual and solo, and until that is obtained a student pilot's permit will allow the holder to fly solo, including cross-country, under the supervision or with the permission of a qualified flying instructor. These conditions will only state in writing what has been the position during the past 22 years in British flying clubs. Pilot members have always been required to fly a minimum of 30 hours under the supervision of a flying instructor before being approved to carry passengers in club aircraft.

FLYING TO RACES

OLLEY AIR SERVICE, LIMITED, are now in a position to provide seats at individual fares, on demand, for flights to Newmarket, Doncaster and York for racing. Departure times from Croydon airport will be arranged to arrive at the destination in time for the first race and the aircraft will leave as soon as possible after the last race. The fares will be £4 to Newmarket, £10 to Doncaster and £12 to York, and the company intend to provide similar facilities to other race meetings if required.

NORTH PACIFIC CONFERENCE

EXAMINATION of the existing facilities for airports, navigational aids, communications, air traffic control, meteorology, operations, search and rescue, and the determination of extra facilities required for the development of air transport in the North Pacific region started in Seattle on July 13th. The North Pacific Regional Air Navigation meeting was to have been attended by member states of I.C.A.O. which have an interest in operations in that area and includes Australia, Canada, China, France, India, Philippines, Netherlands, New Zealand, Siam, United Kingdom and the United States. A revised schedule of I.C.A.O. meetings has been published:—

N. Pacific Regional Air Navigation Meeting (Seattle), July 13th.

African/Indian Ocean Regional Air Navigation Meeting (Algiers) August 24th;

Air Navigation Committee (Montreal) September 6th.

Council (Fifth Session) (Montreal) September 7th.

Air Transport Committee (Montreal), September 8th.

South-east Asia Regional Air Navigation Meeting (New Delhi), November 23rd.

Operations Division (Montreal) February 8th, 1949.

Airworthiness Division (Montreal) February 22nd, 1949.

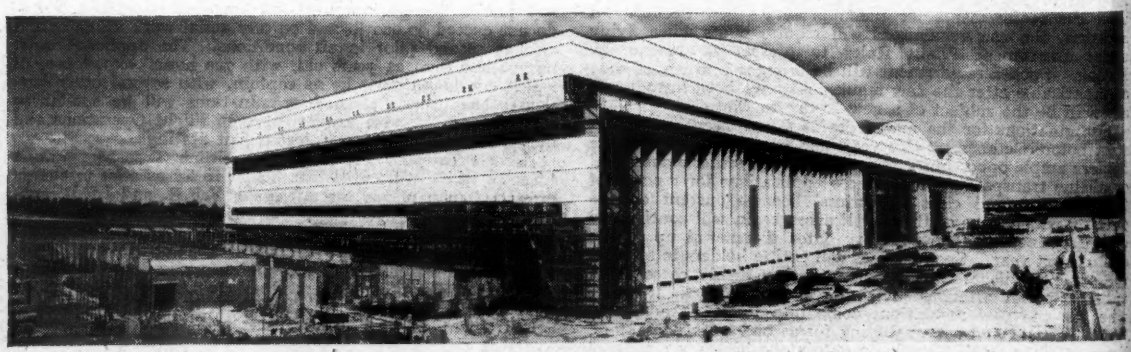
TROUBLE AT IDLEWILD

K.L.M., S.A.S. and Sabena have now also signed contracts with the Port of New York Authority for operating into Idlewild airport. B.O.A.C. has declined to accept any such contract to move from La Guardia since the Corporation operates under an agreement with Pan American Airways, using the facilities of that company which has a long lease at La Guardia. Sabena has also been operating at La Guardia under an arrangement with Pan American Airways, but S.A.S. and K.L.M. have had similar agreements with A.O.A. In 1945 when Idlewild was administered by the City of New York, airlines signed lease agreements based on fixed rentals. The new leases, however, allow the Port Authority absolute power to alter charges at Idlewild from year to year and also the exclusive right to sell fuel to airlines using the airport. These two clauses have aroused considerable opposition from the airlines concerned since it was understood that when the Port Authority took over the original contracts would hold good. Subsequently the Authority announced that it would not recognise the 1945 contracts. Transatlantic operators will be urged to move from La Guardia to relieve congestion, but it has been argued that since their traffic amounted to about only two per cent of the total handled by the airport their removal to Idlewild would not appreciably ease the overcrowded conditions.

TRAVEL ASSOCIATION YEAR

IN the balance sheet for the year ended March 31st, 1948, presented at the annual general meeting of the Travel Association of the United Kingdom on July 15th in London, the expenditure in excess of income was £4,331. For publicity overseas in the form of booklets, folders, posters, Press films and other forms of advertisements the cost was £221,117. Other expenses brought the total to £296,896. During the year 1947, 250,000 foreigners visited Britain on holiday and 86,000 on business. Visitors from the Empire and Commonwealth totalled 55,000. From the United States holiday visitors numbered 36,376 and business visitors 11,583. The average for the years 1936-38 and for 1947 showed that the peak months for arrivals in this country were July and August.

An analysis of the subscription revenue shows that air transport subscribed £539 in the year 1947-48 and £478 in the previous year. The representative in the Association for B.O.A.C. is the Corporation's chairman, Sir Harold Hartley. The chairman of the Travel Association, Lord Hacking, referred in his speech to the deaths of Lord Derby, former president of the Association, and the T.U.C. representative, Lord Dukeston. The new president, Lord Jowitt, was introduced, and in his speech the Lord Chancellor said that tourism was already the largest export trade from this country to the United States, and even the textile industry had to take second place to it In 1948 it was expected to earn over £10,000,000 from the 100,000 American and Canadian visitors.



BRAB-HOUSE: An impressive photograph of the huge assembly hall at Filton, built for the erection of the Brabazon. Arrangements have recently been made between B.O.A.C and Bristols for the use by the former of Filton airfield and part of this building; the Corporation is transferring its maintenance base from Dorval, Montreal, to Filton, and other premises are also being constructed there to save dollars.

BREVITIES

SIR MILES THOMAS, deputy chairman of B.O.A.C., recently flew out to Colombo, in order to negotiate an agreement for a joint B.O.A.C.-Air Ceylon service between Ceylon and the United Kingdom.

* * *

Sir Leonard Isitt, who is a director of New Zealand National Airways, British Pacific Commonwealth Airlines, and Tasman Empire Airways, is due to arrive in Britain next month to study developments in the British aircraft industry.

* * *

Prototype of Sweden's new 24/32-seater air transport, the Scandia, is to make its maiden overseas demonstration flight shortly, and it is expected to visit London towards the end of August, probably on the 20th. The flight marks the conclusion of a long period of development and flight trials.

* * *

A public Court Investigation will be held into the loss of the Swedish airliner SE-BDA and the R.A.F. York MW248, on Sunday, July 4th. Preliminary investigations are continuing meanwhile, and a further announcement will be made in due course giving the composition of the Court and the date on which the formal investigation will be opened.

* * *

B.O.A.C. opened its third post-war year of transatlantic operation on July 1st, and Mr. Vernon Crudge, New York manager of the North Atlantic Division, announced that a total of 57,074 revenue passengers had been carried over the North American routes in two years on 1,224 Atlantic flights. Of that total, 28,562 passengers flew to New York, while the remainder were carried on flights between Bermuda, New York and Baltimore.

* * *

Eight service stations are now being run at British and European airports by Dunlop's Aviation Division. London and the southern area are served by Croydon, Gatwick, Northolt and Heathrow; the Midlands by Birmingham airport; Eire and the Atlantic crossing by Shannon; Central Europe by Geneva; and Northern Europe by Amsterdam. The stations are staffed by engineers trained in the servicing and repair of aircraft and equipment, and from the company's headquarters at Coventry others are available to proceed at short notice by car or by air to any part of Britain or to accessible areas in Europe.

* * *

Permission to operate between New York and Chicago and a terminal point in Iceland has been granted to Loftleidir (Icelandic Airlines, Ltd.), by the American Civil Aeronautics Board. The permit is in accordance with the terms of a reciprocal air transport agreement between the United States and Iceland, and provides for the carriage of passengers, freight and mail. An A.O.A. service to Iceland has been in operation since March, 1947. The Icelandic company, which at present owns and operates nine aircraft, including a Skymaster, is negotiating for the purchase of more Skymasters for a new service to the United States. It is understood that until delivery is taken of additional aircraft the service will be run on an irregular basis, making a minimum of six flights per month.

In answer to a question in the House of Commons, Mr. G. R. Strauss, Minister of Supply, stated that a decision on the future of the Tudor would be made before the end of this month. He was asked to speed up a decision on the matter.

* * *

Instone Lines, Ltd., of 52, Leadenhall Street, London, E.C.3, have been appointed general agents in the United Kingdom for Air Malta, Ltd. A government licence has been granted in respect of scheduled flights to North Africa, Sicily and Italy, and Air Malta, Ltd., has been formed to operate scheduled services under the terms of the licence as from July 1st.

* * *

B.E.A.'s new service to Amsterdam using 27-seater Vikings will start on July 29th, with two flights daily. Aircraft will take off from Northolt at 1020 and 1520 hours, and on the return service departures from Schiphol Airport will be at 1235 and 1750 hours, selected after careful analysis of passenger requirements. Scheduled time for the flight is 1½ hours.

* * *

Pan American World Airways, National Airlines of America and British South American Airways acting conjointly have arranged a circular air tour linking Miami, Nassau and Havana. Passengers may travel via P.A.A. or National Airlines between Miami and Havana, B.S.A.A. between Havana and Nassau and P.A.A. or B.S.A.A. between Nassau and Miami. The round-trip ticket, valid for 30 days, costs $52.50 (£13 approx.), and the excursion may start at any point on the circle.

* * *

Mr. J. W. Kenny who was technical assistant to the chief executive, British South American Airways, has been appointed Technical Development Controller in the Corporation. He is also the Corporation's representative on the Aircraft Requirements and Contracts Committee recently set up by the Airline Chairmen's Committee to review the aircraft replacement programmes.

* * *

Consequent upon the recent granting of a licence to Patrick Duval Aviation Limited to operate a scheduled air service, the company commenced regular flights between Birmingham and the Isle of Man on the 16th of this month. On Mondays, Wednesdays, Fridays and Saturdays aircraft leave Birmingham at 0900 hours and return from the Isle of Man at 1730 hours. The fare is £6 10s single and £11 5s return for either a day or a period. With connecting services to Dublin and Glasgow it should be possible to catch the morning aircraft from Birmingham and arrive at Dublin or Glasgow before lunch.

* * *

Six Sydney air charter companies, including four engaged in flying immigrants to Australia from Europe, may have to discontinue overseas flights this month owing to lack of certified navigators. So far these companies have depended on experienced pilots who were also navigators, but the Australian Department of Civil Aviation has announced its intention of strictly enforcing the rule that navigators on all international flights must have first-class licences, and charter operators are

THE Minister of Civil Aviation was recently entertained to lunch in a Tudor IV in flight by the Board of B.S.A.A. From left to right: Mr. L. J. Dunnett, Under-Secretary (Air), M.C.A., responsible for liaison of all air services departments; Sir Arnold Overton, Permanent Secretary, M.C.A.; Mr. Gerald McTier Sheppard, B.S.A.A. Board and director of various companies connected with shipping, flour mills and meat; Sir John D'Albiac, Commandant, London Airport; Mr. G. S. Lindgren, Parliamentary Secretary, M.C.A.; Lord Pakenham; Mr. J. W. Booth, Chairman, B.S.A.A.; Mr. G. Boggon; Mr. W. R. Blyton, Parliamentary Private Secretary, M.C.A.; Lord Kershaw, member of the B.S.A.A. Board and Chairman of the Court of Referees; Sir J. Stephenson, deputy chairman of B.S.A.A., President of the National Federation of Building Trades Operatives and the Federation of Shipbuilding and Engineering Union, Chairman of Shipyards Group Council and a member of the Ministry of Supply National Engineering Advisory Council. On the extreme right is Air Commodore H. G. Brackley, chief executive of B.S.A.A.

Civil Aviation News . . . . .

finding it almost impossible to engage navigators with such qualifications since the limited number available has been absorbed by the major airlines.

* * *

The British and United States governments have agreed to set aside part of the United States Army Air Base at Atkinson Field, 25 miles from Georgetown, for use as a commercial airport, under the control of the government of British Guiana.

* * *

During the past six years American Overseas Airlines has flown 134,580 passengers across the North Atlantic, and its original service between New York and Eire, via Newfoundland, has expanded to include England, Scotland, Holland, Germany, Norway, Sweden, Denmark, Iceland and Finland. In the same period, the company's fleet flew 31,967,400 miles and a total of 505,000,000 passenger miles.

* * *

Ground Controlled Approach facilities became available at Northolt on July 12th and will operate between 0800 and 2000 hours G.M.T. daily. When landing on runway heading 080 deg. the glide-path setting is 3 and break-off height 170ft. On runway heading 260 deg. the glide-path setting is 3 and break-off height 210ft, but in emergency landings G.C.A. will not normally be made on that runway and on such occasions when it would be necessary aircraft will be diverted to London Airport. In cases of great emergency however when aircraft must land at Northolt, then landings can be made on runway 26.

* * *

It is possible that civil aircraft may supplement the R.A.F. fleet operating the airlift into Berlin. The Air Ministry has been in consultation with the Ministry of Civil Aviation, and the latter has requested various British charter companies, and the three British airline corporations, to submit lists showing the number of aircraft that might be made available, if the necessity arose, for operating into Berlin. So far no civil aircraft have been used.

* * *

In an effort to reduce interference to the reception of television programmes and police and fire communications by car ignition systems, the Radio Industry Council is sponsoring a campaign for ignition suppression. The Marconi Wireless Telegraph Co., Ltd., who are co-operating, have agreed to suppress all vehicles operated by them, in addition to cars belonging to their staff. It is hoped that eventually all motorists will have the necessary resistors fitted to the plug leads of their cars, in the interests of television users and in the general interest of short wave communications.

FROM THE CLUBS

THE flying display staged by No. 501 Squadron at Filton airfield on Saturday, July 10th, was handicapped by very indifferent weather, the ceiling being at 800 ft; nevertheless a very large crowd attended the show. Spitfires from 501 Squadron performed aerobatics and Tiger Moths from No. 12 Reserve Flying School gave a display of crazy flying. The programme included demonstration flights by the Bristol Freighter, Brigand, and Type 171 helicopter. Further details will be published in our next issue.

* * *

MR. G. S. LINDGREN, Parliamentary Secretary to the Minister of Civil Aviation, on July 11th opened the second annual rally of the Auster Flying Club at Rearsby airfield, near Leicester. The weather which earlier had been threatening, cleared just before the opening and fair conditions prevailed throughout the display. The show included a pupil's first solo in a Tiger Moth, a parachute jump by Bernard Lynch, a demonstration of a new military Auster and finished with a 20-mile closed circuit race between nine Autocrats. The first prize of £50 for this event was won by H. C. Rogers, C.F.I., of the Notts Flying Club, who, as reported in *Flight*, July 15th, won a similar race at the Leicestershire Aero Club's "At Home" on July 4th; Mr. B. T. Watson of Brough Flying Club was second. The forced landing contest was won by A. E. Coltman of the Leicestershire Aero Club with E. J. Morton of Coventry Aero Club flying his 1929 Avro Avian into second place. S/L. E. G. Franklin, Armstrong Whitworth's "Flying Wing" test pilot won the arrival competition with C. M. Joy, C.F.I. of the Coventry Club, second.

* * *

IN reporting the Gloucester Flying Club's "At Home" in the preceding issue of *Flight* it is regretted that the winner of the visitors' race was incorrectly given as Mr. Plank, flying an Autocrat, whereas the race was in fact won by Mr. H. Ratcliffe, of Blackburn Aircraft, Ltd. Mr. Ratcliffe was flying the Cirrus-engined Auster, G-AGOH, which is at present undergoing a prolonged endurance test and has in all completed 1,200 hours without a major engine overhaul.

* * *

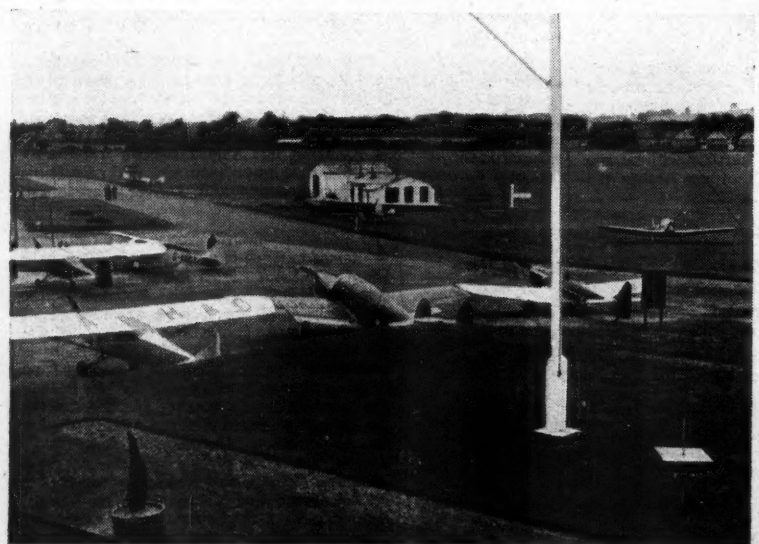
AN invitation to all flying clubs has been sent out by the Brough Flying Club for the garden party and flying display which the Brough branch of the R.Ae.S. and the club are holding on August 21st. Items on the programme are a Cirrus Trophy Competition for Cirrus-engined Austers, a sealed time of arrival competition, a "spot" landing contest open to all comers and aerobatic displays and exhibitions. The R.A.F. and the Navy will, it is hoped, take part and there will be a handicap race for all Brough Flying Club aircraft. The display is being run for the benefit of the R.A.F. Benevolent Fund.

* * *

A CHRISLEA Ace, Newbury Eon and two Fairey Juniors turned up at the Redhill Rally, on July 11th, in spite of bad weather with the cloud base down to 400 feet. Chasing toy balloons filled with hydrogen and bombing a stationary target 6 feet square with bags of slaked lime, provided much amusement during which some good exhibitions of flying were executed by competitors.

* * *

AN informal "At Home," in aid of the Perth War Memorial Fund, was run by the Strathtay Aero Club in conjunction with Airwork, Ltd., on June 26th. A sum of £140 was raised for this charity which is taking the form of the purchase, equipment and maintenance of a mansion house for aged couples. Two club aircraft and Mr. G. McLean's Messenger visited Mac-Merry airfield to support a similar function organized by the Edinburgh Club. The club's flying for June was restricted to 97 hours, mainly by bad weather during the latter half of the month.



"Flight" photograph.

WOLVERHAMPTON VIEW: A "Flight" photograph taken from the clubhouse at Wolverhampton showing some of the aircraft outside the club's hangar. Although started up virtually from "scratch" since the war this club, part of the Air Schools Ltd. organization, has made excellent and energetic progress and has a very high proportion of privately owned aircraft.

HOW THE VAMPIRES CROSSED

The Story of the First Transatlantic Flight by Jet Aircraft

WHILE the six D.H. Vampires of No. 54 Squadron were engaged on the first transatlantic flight by jet-propelled aircraft news of their progress was scanty and often contradictory. Since their arrival in Canada, however, the following account of their achievement has been received from Mr. Thomas Cochrane, Deputy Information Officer, Air Ministry, who flew in one of the accompanying Yorks. It is date-lined "Goose Bay, Labrador, 15th July, 1948," and conveys a vivid impression of the difficulties encountered and the manner in which they were tackled. The account reads:—

In the last light of day, with squalls of rain driving along Goose Bay airfield, Labrador, the first crossing of the Atlantic by jet aircraft was completed at 9.25 p.m. local time (12.25 a.m. G.M.T.) on Wednesday, July 14, when six Vampires of No. 54 Squadron landed at this Canadian base. Within a short time the whole force had arrived and the ferrying of a jet squadron across the Atlantic with its ground crews and equipment had been proved a feasible proposition.

The Vampires left Stornoway in the Hebrides at 10.15 a.m. G.M.T. on Monday, July 12, and covered the 2,202 miles of ocean crossing in a flying time of 8 hrs. 18 mins. The flying times on each of the three legs of the journey were: Stornoway to Meek's Field, Iceland (662 statute miles), 2 hrs. 42 min.; Iceland to Bluie West 1, Greenland (757 miles), 2 hrs. 41 min.; Greenland to Goose Bay, Labrador (783 miles), 2 hrs. 55 mins. All cruising was done at heights between 25,000 and 32,000 ft. along tracks in the upper air which have been little charted anywhere, and over the Atlantic hardly at all. At this height the jet air liners of tomorrow will possibly travel, and the experience gained by this military operation will not be without its value to civil operators of the future.

Ferocious headwinds, estimated at 207 m.p.h., weather fronts extending up to 35,000 to 40,000 ft., sudden fogs sweeping over mountain-locked fiords, are some of the factors which confronted the Force Commander, Wing Commander D. S. Wilson-MacDonald, when sizing up the situation during the period before he was able to give the word "Go."

"In the Teeth of the Weather"

The Force had to carry out this operation against the prevailing winds of the North Atlantic, a characteristic of the weather which is emphasized, indeed exaggerated, at the heights that jets must accept if there is need to extend to anything approaching maximum range. On each leg of this journey the Vampires required favourable conditions as to visibility at point of departure and arrival, and above all in regard to the speed and direction of the wind between 25,000 and 30,000 ft. The winds remained perversely unfavourable for eleven days and then suddenly moderated and gave three days in which the Vampires shot through virtually in the teeth of the weather. The Vampires covered the last two legs—both longer and more difficult than the first—in one day, and in doing so accepted conditions at both points ot arrival that were by no means ideal. They left Iceland at lunchtime and were in Canada in time for supper.

On the leg between Iceland and Greenland the jets ran into cirrus cloud at 25,000 ft. S/L. R. Oxspring led his Vampires under it, but he found himself down at a height of less than 23,000 ft., and there was nothing for it but to go up through the cloud and continue the flight at 32,000 ft. The fact that the jets flew in formation in two flights of three did not make flying through cloud over agreeable, and it says a great deal for the quality of the squadron's training that they kept formation through the innumerable awkward patches of cloud with which they met. The pilots were able to see the coast of Greenland when they were 240 miles away, and could appreciate the vast immensity of the ice-cap over which their track lay.

At Bluie West, S/L. H. B. (Micky) Martin had returned from a weather reconnaissance at this juncture to be warned from the rescue launch half-way down the steep fiord, which leads up to this mountain-locked airfield from the south, that cloud was coming down and moving in towards the base. Unfortunately, one of the engines of S/L. Martin's Mosquito PR34 was found to be temporarily unserviceable, but the York freighter which was also at Bluie West with the advance fuelling party came to the rescue. Piloted by F/L. Dudley Scorgie, one of the three V.I.P. York captains from No. 24 Squadron, Transport Command, with the Force, the freighter, with S/L. Martin working the radio-telephone, took up its position at 8,000 ft. above the edge of the ice cap at the point over which the Vampires would have to come in to get into the airfield if the cloud came far enough up the fiord to cover the airfield. From this direction the approach into Bluie West is down the path of a huge glacier between sheer walls of rock. The "safe" approach to Bluie West is up the 50-mile fiord which is less than half-a-mile wide at points. With the cloud down over the fiord there is no alternative but to come down from over the 7,000 ft. ice-cap.

A York "Lighthouse"

S/L. Martin made several anxious calls over the R/T. to "Mosquito 620 or any Vampire" before the faint call came over the earphones that the escorting Mosquito was "reading" from the York. The Vampires were given the York's position, and between the two layers of cloud which lay east of the airfield the navigator of the York fired off Very cartridges as markers for the approaching jets. Through a gap in the clouds those in the York saw for a moment six evenly spaced lines of vapour trails as the jets came on straight over the ice-cap. The York called up to S/L. Oxspring when he was directly overhead, and at the same time the squadron commander picked out the airfield and lost no time in leading the formation down to the single sloping runway of what must be one of the most difficult situated airfields in the world.

The advancing cloud kept off a mile or so down the fiord and as strong earlier winds between Greenland and Labrador had abated the decision was made to go on; five hours after arrival the Vampires were again airborne, and heading west. The forecaster had given a weather front en route stretching up to 15,000 ft. When it was encountered at about the point of no return the squadron found the clouds piled up to well beyond 30,000 ft. For a short time course was changed and varying heights tried before the formation could settle down to level progress at 32,000 ft. Conditions at Goose Bay were not pleasant as the Vampires circled down, but the light was fading and no time was lost settling down on to the wide runway.

The transatlantic crossing was shared by all nine pilots from No. 54 Squadron who had been allotted to the Force. They were divided into three sections: Blue: S/L. Oxspring, F/L. H. W. Wright and Plt. I. I. S. Evans; Red: F/L. F. G. Woolley, Plt. I. W. G. Wood and Plt. II. R. J. Skinner; and Black: S/L. N. H. Courtney, F/L. C. I. Colquhoun and F/L. N. W. Heale. The Stornoway-Iceland first leg was flown by Blue and Red sections; Iceland-Greenland by Blue and Black, and Greenland-Labrador by Red and Black. Thus each pilot did two legs of the transatlantic crossing.

At Goose Bay the squadron was given a great reception by the R.C.A.F. Also there to meet them was Colonel Dave Schilling, one of the U.S. Air Force's greatest fighter pilots, who was waiting to take off with sixteen Shooting Stars on the reverse of the route the Vampires had just covered.

This aspect of the Fairey Gyrodyne emphasizes the roomy cabin and shows the buffers which protect the tail during landing.

The Gyrodyne

Mechanical Features of the Fairey Helicopter

(Continued from page 79, July 15th.)

LAST week we published the first part of the lecture given by Dr. J. A. J. Bennett to the Helicopter Association of Great Britain on July 10th, in which Dr. Bennett, who is head of the helicopter branch of the Fairey Aviation Co., Ltd., explained the aerodynamics of the gyrodyne principle and pointed out the advantages of the low-torque, non-propulsive rotor. The second part of the lecture, given below, was devoted to a description of the mechanical features which translate theory into practice in the Fairey Gyrodyne.

Automatic Pitch Variation

Apart from the novelty of the gyrodyne configuration, Dr. Bennett said, the Fairey prototype incorporates a number of novel features, with regard to which patents are pending in a number of countries. Blade torsional bearings are eliminated entirely, and collective pitch change is effected automatically about the flapping and drag articulations. There are no flight controls other than stick, throttle and foot pedals. At the request of the Ministry of Supply, however, an alternative hub arrangement has been designed incorporating an over-riding collective-pitch control, mainly for trim purposes at altitude, and this will be evaluated later under a Government contract.

Tilting-head Control

The present machine is controlled by a tilting-head arrangement, which eliminates the multiple levers and bearings of the conventional cyclic-pitch method, although the alternative hub for the Ministry of Supply is provided with cyclic-pitch as well as collective-pitch control. It should be of interest to compare the operation of the two alternative systems on the same aircraft.

Cyclic-pitch control has so far been preferred for helicopters, and control by tilting of the hub axis has been preferred for rotors which are autorotative in flight, mainly for reasons of mechanical simplicity in both cases, but also, in the case of the helicopter, because cyclic-pitch control allows the tip-path plane to remain nearly perpendicular to the hub axis, which is important for the purpose of minimizing vibration.

As the gyrodyne rotor normally operates neither in the non-powered condition of the autorotative rotor nor in the fully powered condition of the propulsive rotor, but somewhere about half-way between these two extremes, it is appropriate that the control should conform to neither of the two conventional forms but should combine certain features of both. It resembles the tilting-hub method, but in the gyrodyne the hub axis, i.e., the axis of the main bearings, is not tilted. Instead, the rotor head (the hub member to which the blades are attached) is tilted with respect to the hub axis, and in forward flight the forward inclination of the head balances the backward inclination of the tip-path plane with respect to the head, so that the tip-path plane remains substantially at right-angles to the hub axis, giving effectively the same result as cyclic-pitch control.

The three flapping hinges all intersect on the axis of rotation and are inclined to the blade axes at about 60 deg. when operating at zero torque. In response to torque, this angle increases progressively and attains a value of about 70 deg at full torque. The automatic change in blade angle is associated with the angular displacement of the blade in azimuth, and is caused partly by a so-called "alpha one" inclination of the drag hinge and partly by the variation in "delta three." The combined effect is such that there is an immediate increase in boost whenever the throttle is opened, without there being any appreciable change in angular speed of the rotor. The blade articulations, therefore, self-govern the collective pitch quite independently of any over-riding collective-pitch control that may eventually be provided for other purposes.

Power Plant and Transmission System

The Fairey prototype is powered by an Alvis Leonides nine-cylinder air-cooled radial engine, which has a maximum sea-level rating of 515 b.h.p. at 3,000 r.p.m. It is mounted vertically inside the fuselage and cooled by a fan driven at engine speed. The cooling air is drawn in through openings in front of the rotor pylon and discharged through ducts in the tail unit. Ducts are also provided to deflect air through the oil cooler and the engine-driven generator.

The installation of the power plant and transmission consists of four self-contained units; first, the engine, its mounting and cooling system; second, the main gear box providing the first-stage reduction gears for the rotor and airscrew drives, and incorporating the clutch and the freewheel; third, the top gear box which houses a double epicyclic gear that provides the final gear reduction between the engine and the rotor, with a rotor brake mounted above it; and fourth, at the outer extremity of the starboard wing, a gear box carrying the airscrew reduction and pitch-changing gear.

The engine is coupled to the main gear box by a splined shaft carrying a multi-bush universal coupling at each end, the fan being mounted on the coupling nearer the engine. This arrangement allows the engine and fan to float on the rubber mountings provided for the engine, and covers mal-alignment between the engine and the main gear box.

Main Gear Box

The main gear box, which is mounted on four rubber bushes, carries the clutch, the vertical shaft drive, the side airscrew drive, the freewheel, the Lockheed pump drive, the oil pump for the main and top gear boxes, and the engine and rotor tachometer drives. The airscrew is positively geared to the engine and is unaffected by clutch operation. The vertical shaft is driven by bevel gears and the airscrew by a smaller pair of bevels. A central shaft running at engine speed carries the clutch casing, and the clutch plates are splined to an extension on the driving bevel. A Lucas actuator is provided for controlling the rate of clutch engagement, thus limiting the maximum starting torque and ensuring that the rotor blades cannot be broken by a sudden engagement of the clutch. The freewheel is located above the main bevel and, as the rotor tachometer and hydraulic pump are required to be driven when the rotor is freewheeling, the drives for these services are located above the freewheel.

Top Gear Box

The top gear box is coupled to the main gear box by a tubular vertical shaft fitted with a torsional rubber coupling

at each end. Oil is delivered to the top gear box by a pump located in the oil sump of the main gear box and circulates through the top gearing, the freewheel and the gearing in the main gear box before returning to the sump. Thermocouples are fitted to all gear boxes. The oil cooler is carried in a duct which diverts air from the fan through the cooler.

Airscrew Drive

The airscrew shaft, whieh is in two lengths, is driven from the main gear box through a torsional rubber coupling embodying a sliding joint. A rubber-mounted bearing is located at the centre of the airscrew shaft to support the Hardy Spicer universal coupling which connects the two lengths of shaft. A second Hardy Spicer coupling connects the outboard end of the shaft to the airscrew gear box. This gear box carries its own oil pump and oil supply.

Rotor Blades

The rotor blades are of steel tubular spar and wooden rib construction, and are covered with plywood and fabric. The spar is circular in section at the root end, but, over the greater part of its length, it is of oval section, which combines rigidity in torsion with flexibility in vertical bending. A root flange integral with the spar enables the blade to be attached to the root fitting without perforation of the tube, thus avoiding stress concentration. Drilling of the spar is also avoided at the rib clips, which are attached frictionally over the main portion of the blade and not by bolted or welded joints. The rotor blades have been manufactured to very close tolerances, and, as a result, have been trouble-free throughout all the tests. The hydraulic dampers for damping the blade motion in the plane of rotation, although provided with only a moderate amount of damping, have proved satisfactory in suppressing entirely self-excited instability.

Other Design Features

The present fuselage is of steel tube construction, although a metal monocoque fuselage is being provided for production. The pilot's seat is on the port side at the nose of the cabin, and to his right an occasional seat with dual control may be installed. The back seat is designed to take three passengers. The rear portion of the fuselage carries a tailplane and outboard fins, which are required for stability purposes in forward flight. The stub wings are merely fairings for the structure which supports the outboard airscrew and the main legs of the tricycle undercarriage.

The flight controls are, as in conventional aircraft, stick, throttle and foot pedals. The stick controls the angular displacement of the head through hydraulic jacks, which completely eliminate stick shake, though the initial few hours of flight were performed with reversible controls. The operation of the collective pitch of the airscrew by the pedals is also arranged hydraulically. Centralizing springs are provided in all controls.

Performance

The flight trials of the prototype are being conducted at a gross weight equal to that of the production aircraft, which, including pilot, 3 passengers, 150 lb luggage and 47 gallons of fuel, is approximately 4,800 lb. The empty weight of 3,600 lb is apportioned as follows:—

	Per cent
Rotor blades	8
Power plant and transmission	47
Structure	30
Fixed equipment	15

The rotor diameter being 52ft, the corresponding disc loading is 2½, and as the solidity is relatively low (being only 1 per cent per blade) the blade loading has a relatively high value of 75.0. At 3,000 engine r.p.m. the rotor speed is 227 r.p.m., giving a tip speed of 619 ft/sec and a thrust coefficient of 0.082 (based on blade loading).

The first flight of the gyrodyne entirely free from ground restrictions was accomplished successfully on December 7, 1947, after a period of preliminary ground testing, during which the engine was run for 85 hours and the rotor for 56 hours. At 4,800 lb gross weight and 190 rotor h.p. the blades have sustained in hovering flight at a few feet from the ground a load of 25 lb per rotor h.p., which allows an ample margin of power for vertical climb, even assuming that the power applied at the rotor hub is only 50 per cent of the brake horse-power developed. The present gyrodyne, therefore, differs little in vertical performance from the best existing helicopter and, without making any definite claim at this stage in regard to climb (at the best climbing speed) and in regard to the maximum speed in level flight, the gyrodyne appears in both respects to be markedly superior to present helicopters. Moreover, this improvement in performance is effected without departing appreciably from the low disc loading and the low-pitch advantages which contributed basically to the remarkable record of safety achieved by rotary-wing aircraft in the pre-war era.

Component Research

Current Investigations at the Laboratories of the M.I.R.A.

EACH year the Motor Industry Research Association Laboratories, Brentford, arrange "Open Days" when work in progress can be witnessed and problems can be discussed with members of the staff.

Naturally, most of the work undertaken deals specifically with road vehicles but in many instances research on materials, fuels, engine components and engine operation are of value to the aircraft industry. Cases in point are studies of the strength of cast crankshafts, the sludging of lubricating oil, oil filtration and the effects of leaded fuel on valves.

The friction loss in an engine is measured by motoring it under simulated operating conditions. Normal intake and exhaust manifolds are removed and replaced by a common chamber so that air circulates in a closed cycle. The circulating air is pressurized and the mean cycle pressure is thus raised to the value which obtains under normal working conditions. Sump oil and jacket water are heated to the operating temperatures. The electrical energy necessary to rotate the engine by means of an electric motor of known performance will then indicate the frictional horse-power. On the nominal 10 h.p., four-cylinder engine demonstrated, it has been found that a drop of one deg. Centigrade in either lubricating oil or cooling water temperature increases the frictional loss by 0.01 h.p. To motor the cold engine with both oil and water at room temperature, as when starting up, requires about twice the energy needed at normal working temperatures.

Measurement of gas leakage past the piston rings is the subject of another investigation. To seal the crankcase is impractical and liable to yield misleading results, so a method using an open crankcase is adopted. The crankcase is connected to a surge chamber of a relatively large volume to damp out any pulsations, and a vacuum pump maintains the crankcase at atmospheric pressure.

An allied study is piston ring arrangement and the relative importance of pressure and oil control rings. This is a long term investigation which will also include design of rings and location on the piston. The present set-up rings all the changes on two pressure rings and two control rings all mounted above the gudgeon pin. Already interesting facts are emerging from the tests. The removal of one or both control rings may reduce blow-by as the oil on the cylinder wall makes a more effective seal but, of course, leads to an increase in oil consumption. Two pressure rings and one oil control ring would appear to be the best compromise. Incidentally, the method of regulating engine speed has a marked effect on blow-by. Where control from the maximum is by throttling, peak pressure in the cylinder is lower and gas leakage will be reduced. On the other hand, if control is by retarding the spark a somewhat lower pressure, occurring later in the stroke and extending over a greater crank angularity may result in a similar mean pressure and maintain the rate of blow-by.

An ingenious method of studying the bending fatigue strength of gear teeth uses a modified diesel fuel injection pump to furnish smooth pulsations at a wide range of cycles per minute and at predetermined values up to about 5,000 lb/in^2. The pump delivers to a pressure cylinder having a bore area of 2 in^2 and the tup bears on the tip of the tooth under test.

Another new device of considerable interest tests the torsional fatigue of crankshafts. The crankpin under test is arranged as the node of a freely suspended two-mass system and excitation to approximately resonant speed is by means of out-of-balance weights rotated on one of the masses. Torque is measured by a torquemeter which eventually will be arranged to exercise control of speed so that a predetermined torque is applied continuously. Cranks can be tested to fracture in the relatively short period of three to four hours.

A Private Venture

Tiltman Langley Laboratories Launched

The drawing office at the Tiltman Langley Laboratories at Redhill airfield.

NATIONALIZATION and big combines are the order of the day, but the "little man," if he has the brains and the will, can still find scope for his abilities. Even in the aviation world there are many problems which the large firms do not particularly want to tackle, since to do so would in some cases mean setting up a new department, or interfere with a current production programme.

The Tiltman Langley Laboratories, Ltd., now established at Redhill Aerodrome, are largely based on this fact. The firm is still a small one and has grown from very modest beginnings, but already a considerable amount of valuable work is being done, including some which is outside aviation. Works and office accommodation was secured at Redhill last October, but since then many obstacles have had to be overcome in the way of obtaining equipment, etc. However, a good start has been made, and an experienced staff of about 50 has been got together. It might be mentioned that the whole capital of the company is held by its members, and there are no outside financial interests of any sort.

Tiltman Langley Laboratories can be said to have begun in an office at 175, Piccadilly, in 1944, when A. Hessell Tiltman and Marcus Langley formed a partnership to do consultative work for the Air Registration Board and the Ministry of Aircraft Production. The following year the partners were joined by Mr. J. J. Gerritsen, a South African, who had been working in England for some ten years. They also acted as technical consultants to the Chelsea College of Aeronautical Engineering, and thus came into close contact with Mr. C. H. Roberts, the principal of the College, who is now chairman of Tiltman Langley Laboratories.

Early in 1947 practical research and development began to dominate the consultative side, and it became clear that if the partners were to satisfy all demands it would be necessary to have laboratories and workshops under their own control.

Composition of Tiltman Langley Laboratories now includes C. H. Roberts (chairman); Marcus Langley (managing director); A. Hessell Tiltman (technical director); G. D. Duguid (director); J. J. Gerritsen (chief engineer); and F. J. V. Holmes (works manager). Mr. Duguid is chief technical engineer of the College of Aeronautics, and Mr. Holmes is one of the "old-timers" in British aviation.

Other members of the senior staff are R. C. Abel, R. S. Carter, N. O. Rawlinson, W. H. Mayall, J. W. Sutcliffe, and S/L. A. G. Stanley. All are specialists in some branch or other, so it will be seen that the team is a strong one. It might be pointed out here that the firm has full A.R.B. design approval, and that both A.R.B. and A.I.D. have granted inspection approval.

F. J. V. Holmes, M.B.E., works manager (left), and J. W. Sutcliffe, A.F.R.Ae.S., chief inspector.

One result of the association with the College of Aeronautical Engineering is that use can be made of the metallurgical laboratory and test house at Filmer Road, Fulham, the superintendent of which is Mr. R. A. Beaumont, who is well-known for his original work on proof-stress determination. The equipment of this test house is very complete and includes a 20-ton Buckton universal tensile and compression testing machine. This equipment is available for supplementing any that is already installed at Redhill, or which will be acquired later.

Marcus Langley, F.R.Ae.S., managing director, and (right) Hessell Tiltman, B.Sc., F.R.Ae.S., technical director.

The Old and the New

By way of illustrating the kind of work undertaken mention may be made of the fact that two de Havilland Flamingoes are being rebuilt to the order of British Air Transport, Ltd., and that the opportunity has been taken to incorporate certain modifications (agreed to by de Havillands) as part of the normal development of the type.

The Flamingo, although an old type by now, is a very efficient and economical aircraft, and although it is a twin-engined type, it will comply fully with the latest I.C.A.O. requirements for single-engine performance.

The Laboratories have also undertaken the design and a mock-up of a small amphibian for Sponson Developments, Ltd. This will be a 3/4-seater with two Cirrus Major

A Private Venture . . . . .

or Gipsy Major engines. We hope to publish some details of this project next week.

A large contract has been accepted for the testing of structural materials in order to establish their less-known characteristics. A programme on the effects of corrosion on the physical properties of light alloys, and an assessment of the effectiveness of surface protection, is also in hand.

One extremely interesting task is the testing and development of the Gerritsen gear, invented and designed by the company's chief engineer. This is an infinitely variable gear of very simple design, and already the earlier tests have shown great promise. When fully developed and proved, this gear should have numerous applications.

As already mentioned, Tiltman Langley Laboratories have much work in hand apart from aircraft, and we have no doubt that activities will increase as the firm becomes better known. Hitherto Tiltman and Langley have preferred to say nothing about themselves, and their work was known to but a few. Now that their existence has been "officially" announced, we expect our old friends to be kept busy.

(Left) J. J. Gerritsen, B.Sc., A.F.R.Ae.S., chief engineer, and N. O. Rawlinson, B.Sc., A.F.R.Ae.S., project engineer.

FIREFLY'S NEW ROLE

A CONTRACT from Sweden for a target-towing version of the Fairey Firefly two-seat naval reconnaissance-fighter has been received by the Fairey Aviation Company. These aircraft are fitted with a standard Type B.Mk.IIB windmill-winch able to stream 7,000ft of cable. They will be used to tow glider and sleeve targets for ground-to-air and air-to-air firing practice, and will be equipped for changing sleeves in flight. This new contract means that the Firefly will now fulfil five distinct duties in service; day fighter-reconnaissance (FR Mk.1, FR Mk.4, FR Mk.5), night fighting (NF Mk.5), anti-submarine patrol (AS Mk.5), operational training and target towing. The Firefly is in service with the Royal Navy, Royal Canadian Navy and Royal Netherlands Navy, and has been chosen for the Royal Australian Navy. Years of valuable work lie ahead of this Griffon-powered two-seater, which bids fair to rival the illustrious Swordfish in adaptability and all-round usefulness.

ATOMIC POWERED AIRCRAFT

IN a paper recently delivered before the Detroit section of the Society of Automotive Engineers, Andrew Kalitinsky, Chief Engineer, N.E.P.A. Division, of the Fairchild Engine and Airplane Corporation, gave an extremely interesting survey of the basic requirements and problems of atomic power supply for aircraft propulsion.

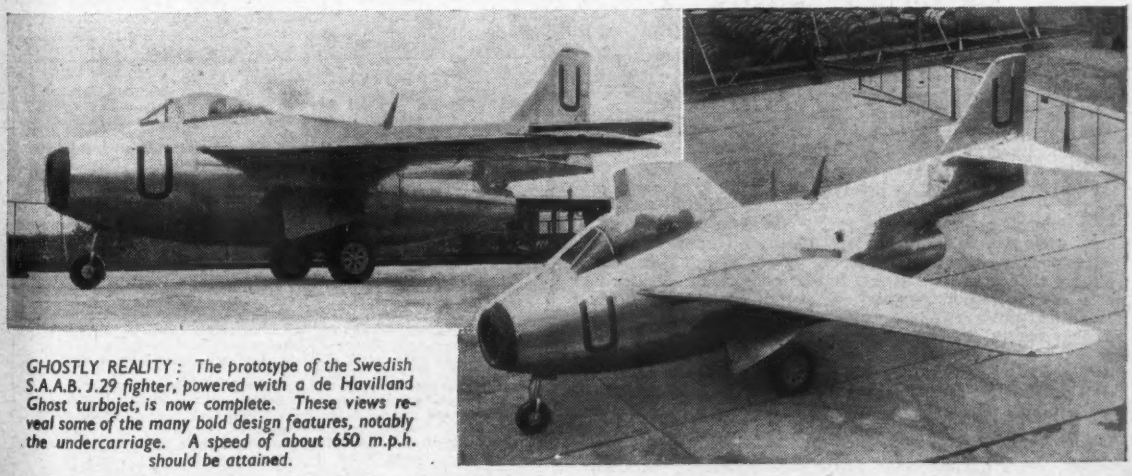
Among the basic types of power plant which can be adapted to utilize atomic energy, the lecturer cited the closed-cycle turbine of steam or mercury type, the steam being generated in a nuclear reactor, or pile, by the heat released there. The reactor therefore replaces the boiler of a conventional power plant. After expansion through the turbine, which drives the airscrew, the steam is condensed and forced back into the boiler reactor by a feed pump. This type of power plant requires the use both of an airscrew and an air-cooled condenser and these will eventually limit the aircraft speed at which such a power installation can be used.

In applying atomic energy to a turbojet, the conventional combustion chamber is replaced with a nuclear reactor. Air is compressed in the compressor and then forced through the reactor where it is heated by convection instead of by combustion of fuel. The air then expands partially through the turbine, enough to provide sufficient power to drive the compressor, and finally in the jet nozzle where it creates the propulsive thrust.

Mr. Kalitinsky also suggested the use of a reactor to replace the combustion process in a ram-jet type unit, and then went on to consider the use of nuclear energy for rockets. In a rocket, the highest possible temperature and the lowest possible molecular weight are desired. Normally, since the propellant is the result of the combination of at least two atoms, its molecular weight will obviously be fairly high; for example, if hydrogen and oxygen are used, the resultant propellant is water vapour with a molecular weight of 18. However, if nuclear energy is used to provide the high temperature, there is no need for the process of combustion, and very light propellants like hydrogen, with a molecular weight of 2, can be used. Since the ratio of 18 and 2 is 9, and the square root of 9 is 3, the specific impulse of pure hydrogen at the same temperature is three times that of water vapour.

Of the engineering problems, one of the more crucial is the protection of the uranium in the reactor against corrosion by the working fluid, and, conversely, the prevention of the escape of the radioactive fission products from the reactor into the working fluid. This is a problem of diffusion, and as diffusion rates generally go up with increasing temperatures, the development of adequate cooling for the high-temperature reactor elements is a major problem.

Another crucial problem is weight. In an atomic engine, it is necessary to use large amounts of mass to stop the radiations emitted from the fission process. Not only the absolute weight of the shielded reactor is important, but also its specific weight, and it can be shown that the specific weight of the reactor must be less than, or equal to, the lift/drag ratio times the ratio of permissible reactor weight to aircraft gross weight.



GHOSTLY REALITY: The prototype of the Swedish S.A.A.B. J.29 fighter, powered with a de Havilland Ghost turbojet, is now complete. These views reveal some of the many bold design features, notably the undercarriage. A speed of about 650 m.p.h. should be attained.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

EMERGENCY CONTROLS

Confirmation of Boston Recollection

I CAN assure J. Westhead (July 15th) that he was certainly not dreaming when he saw that Boston "with the strange device," and, while not knowing of any actual instance when it was used, I can, I think, give the explanation of why the gunner's controls were fitted.

It was intended on this machine that in the event of the crew taking to the silk, the pilot should leave before the gunner, owing presumably to the proximity of the airscrews to the front seat, and the consequent danger to the pilot in his escape. The gunner's duty was thus to hold the aircraft straight and level for the few seconds of his pilot's exit, after which he, too, would step on air.

Engine controls being non-existent, the lack of forward view can be seen to be no great handicap. I can hardly avoid a feeling of deep sympathy for the unfortunate gunner himself who was then left to sidestep the tail (or was there a floor escape hatch? I forget). So far as I know, there has been no other aircraft fitted with this system of control.

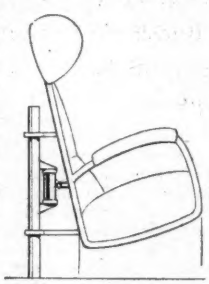
London, N.7. A. S. BOLTON.

PASSENGER DISCOMFORT

Why Not Shock-absorbing Seats?

"GUST Hunting" (*Flight*, July 15th, 1948) and other sources have recently drawn attention to a subject of steadily increasing importance.

Apparently, while aircraft of the 500 m.p.h. order will be able to stand the shocks imposed by gusts, fare-paying passengers will not. One news item even infers that unless gusts can be accurately forecast, passenger discomfort alone may seriously jeopardize the chances of really high-speed commercial operation.



If these theories are eventually substantiated, and the met. men are unable to provide the necessary forecasts, I suggest as an interim measure the possibility of a shock-absorbing seat.

The diagram shows an outwardly conventional airline seat, "floating" on vertical guides, its upward and downward movement, as required by negative or positive gusts, controlled by a small double-acting hydraulic shock-absorber.

Incidentally, even for present-day airline usage, a seat of this type would be well worth its slightly increased weight if it built a commercial reputation "ironing-out the bumps."

Mitcham. A. BOWBEER.

THE NORTHOLT DISASTER

A Possible Explanation

REGARDING the collision on Sunday, July 4th, between a Swedish DC-6 and an R.A.F. Transport Command York: I was flying from Shoreham, which is some 50 miles south of Northolt, on the same day, giving Women's Junior Air Corps girls 15-minute "air-experience" flights in their own Fairchild. Every quarter of an hour I landed I had to reset my altimeter 50ft.

By 1600 hours the weather had deteriorated to 200-300ft cloud base, with visibility 1,500-2,000 yards in heavy rain, and I was no longer in the air. On tuning-in to Air Met. I found they still went on saying after 1600 hours "a cold front stretching from Worcester to Lands End," etc., etc., a report that bore no relation to the conditions. The wind was about 40 m.p.h. gusting, and extremely turbulent conditions had prevailed since the morning. The weather report given to the M.C.A. and R.A.F. side of the airfield (University Air Squadrons in camp residence) was similar, but at least warned of gales due at 2000 hrs. These were already with us.

If the similar conditions prevailed 40 to 50 miles north of Shoreham, the altimeter of the York could have been 200 ft. out after circling for one hour. If also the QFE he was given was from the previous hour's actuals, that could account for another 200 ft. The human factor plus turbulent conditions that day would have accounted for the extra 100 ft.

If the DC-6 arrived an hour or so later, he might have been given the QFE for his hour, but if not, and with the above performance of the York's altimeter, he would really have been flying the same 500 ft. circuit in the stack.

Chelsea, S.W.3. DIANA BARNATO WALKER.

LINKS WITH THE PAST

Another "R.F.C. Son" in Atlantic Vampire Flight

I READ with much interest, in the article "Vampire Venturers," published in the edition of *Flight* dated July 8th, that the six D.H. Vampires of 54 Squadron, the first jet aircraft to fly the Atlantic, were led by the son of "Oxo" Oxspring of World War I fame. But this is not the only link between this epic flight and the R.A.F. of World War I.

F/L. F. G. (not F. C.) Woolley, D.F.C. and bar, who leads the formation aerobatic team, is the son of G/C. F. Woolley, C.B., O.B.E., D.F.C., who started his Service career in the R.F.C. in 1917 and served as a fighter pilot in France in 79 Squadron (Sopwith Dolphins) in the famous 11th Wing, under General (then Colonel) P. Van Ryneveld. G/C. Woolley personally taught his son to fly (in 1940) and gave him his first lessons in aerobatics and air combat. Within six weeks of passing out of F.T.S., at the age of 18, he was awarded a D.F.C. and given the command of a flight. He was commanding a squadron at the age of 22.

"ONE OF THE OLD HANDS."

BENEVOLENT FUND HELPERS' CORPS

R.A.F. Association Ready to Help

YOUR note under the above heading, which appeared on July 8th, will cause some considerable astonishment to the 200,000 members of the R.A.F. Association, all of whom are willing, and the majority ready and able, to help the Benevolent Fund.

There are over 500 Branches of the Association in the United Kingdom, and each Branch has a Welfare Committee. These Committees are in an excellent position to investigate cases for the Benevolent Fund, and thereby would be fulfilling the main objects of the Association—comradeship and mutual help to ex- and serving R.A.F. and W.A.A.F. The Association has also a Medical Consultative Committee, which is always willing to help and advise the Benevolent Fund.

It seems a pity, therefore, that once again the Benevolent Fund should ignore the Association and seek to utilize other organizations and individuals no better qualified than Branches and members of the Association.

The Dorking Branch, of which I am one of 200 members, last year raised £90 for the Benevolent Fund by its efforts in Battle of Britain Week. Many Branches raised more. One can only regret the unfortunate effect on such efforts which this "slap in the face" will have, particularly when it is added to the fact that not one mention of the Association is made in the Benevolent Fund's Annual Report.

Dorking, Surrey. R. W. DURAND.

FORTHCOMING EVENTS

July 24th to 26th.—Private Air Rally for members and associate members of the Royal Aero Club at La Baule-Escoublac, St. Nazaire. (Guests of M. F. André).

July 24th and 25th.—Aero Club de Suisse: International Air Rally Blecherette airfield, Lausanne.

July 31st.—Aero Club of Orange Air Rally.

Aug. 1st.—Boroden Cup for Model Aircraft with mechanical engines, London Region.

Aug. 7th.—Air Meeting and Competitions at Ypenburg, Holland.

Aug. 7th.—Midland Aero Club: "At Home," Elmdon airport.

Aug 14th.—R.Ae.S. (Graduate and Student): Visit to National Physical Laboratory, Teddington.

Aug. 14th and 15th.—Butlin's Week-end Air Rally at Pwllheli, N. Wales.

Aug. 15th.—Wiltshire Flying Club: Thruxton air races, Thruxton airfield, Andover, Hants. (Altered from Aug. 21st.)

Aug. 21st to 29th.—International Aviation Week, Grerchen airfield.

Aug. 22nd.—Cowes Aero Club: Annual air display, Cowes airport, I.O.W.

Aug. 26th.—R.Ae.S. (Glasgow): Lecturettes, Grand Hotel, Glasgow.

Aug. 26th to Sept. 11th.—Machine Tool and Engineering exhibition, Olympia, London.

Aug. 27th to Sept. 5th.—Aero Club de France. "Tour de France."

Aug. 28th—R.Ae.S. (Graduate and Student): Visit to Vickers-Armstrongs

Aug. 28th and 29th.—Cinque Ports Flying Club: International flying meeting, Lympne airport.

Sept. 7th to 12th.—S.B.A.C. Exhibition and Display, Farnborough airfield, Hants.

SERVICE AVIATION

READY-MADE AIRFIELD: Sunderlands are operating to and from the Havel Lake in Berlin in an endeavour to supply the British sector by air. Extra runways which are now being laid to alleviate crowding at airfields will take some time to construct.

"Ocean" Home

THE 14,000-tons light fleet carrier H.M.S. *Ocean* (Captain W. R. C. Leggatt, D.S.O., R.N.) arrived at her home port of Devonport on July 1st, having completed a two-and-a-half years commission on the Mediterranean Station. Her aircraft had already been disembarked at Glasgow. Since she went to Malta in January, 1946, she has steamed more than 58,000 nautical miles, and approximately 6,000 landings have been made on her deck by aircraft.

Auxiliary Appointment

THE Air Ministry announces the following Royal Auxiliary Air Force appointment:—

Wing Commander John Arden Caulfield Houghton to command No. 3617 (County of Hampshire) Air Defence Unit, vice Wing Commander the Duke of Newcastle, O.B.E., transferred to the Royal Auxiliary Air Force Reserve of Officers.

The Air Ministry also announces the following appointment:—

Wing Commander Hector MacLean to command No. 3602 (City of Glasgow) Air Defence Unit, R.Aux.A.F.

R.A.F. Rifle Team Wins Again

AFTER winning the Inter-Services Small Bore Rifle Match last month the R.A.F. scored another success when they won the United Services Challenge Cup at Bisley on July 9th. The total score—1,359 out of a possible 1,600—is a record for this competition which is competed for by teams representing the Army, Royal Navy, Royal Air Force and the Territorial Army. Captained by W/O. R. Bennett the winning team, with individual scores in parentheses, was composed of S/L. C. C. Willett (184), F/L. H. A. Steele (176), Cpl. J. Witts (173), F/S. A. E. Williams (171), F/L. A. D. Woodcock (171), F/L. H. Gill (170), W/C W. H. Hampshire (163), and A/C. D. Warner (151); the possible score in each case was 200.

Royal Air Force and Naval Aviation News and Announcements

R.O.C. Scottish Exercise

ON Sunday next the Royal Observer Corps in the north of Scotland will be going into action for the first time since the war. No. 39 Group, which did not participate in last month's exercise, will hold a large-scale exercise with the co-operation of R.A.F. reconnaissance Lancasters and naval aircraft from the R.N.A.S. Lossiemouth. The centre of the operation will be the former R.A.F. operations room at Raigmore House, Inverness, where reports from 120 observers manning 27 posts will be received.

Recruits are still needed throughout the group, particularly in Inverness. There are at present 145 observers enrolled for post duty and 30 for centre duties, but at least twice as many are required for the posts and three times the number for the Inverness centre. Because of the lack of response on the part of men volunteers, the Fortrose post, at the entry to the Moray Firth, will be manned entirely by women for Sunday's exercise. Thirty observers from Oban will visit the Inverness centre to gain experience in ops room work.

Commissions in Ground Branches

GENERAL Duties Officers on emergency, short service or extended service commissions may now be recommended for permanent commissions in ground branches. Confirmation of the permanent commission will depend on completing training or a period of duty satisfactorily.

Naval Promotions

INCLUDED in the Admiralty promotion list is the name of Captain Edmund Walter Anstice, R.N., who has been promoted to the rank of rear-admiral with effect from July 10th, 1948. Born in 1899, Admiral Anstice is an officer with wide experience of naval aviation. He was assistant director in the Naval Air Division at the Admiralty at the outbreak of war, and served in command of aircraft carriers. In May, 1944, he became Chief of Staff to the Flag Officer Carrier Training and in August of the following year was Commodore Flying Training.

Entry to U.A.S.s

STUDENTS who enter a university after completing their full-time National Service in the R.A.F., whether they have been partially trained as pilots or have received no pilot training at all, may now be accepted for membership of University Air Squadrons. Hitherto, membership has been confined to students provisionally selected for permanent commissions in the Royal Air Force, students without previous service in H.M. Forces, and ex-Air Force pilots qualified up to basic standard.

Before the war there were only three University Air Squadrons—at Oxford, Cambridge and London. These were

Service Aviation . . . . .

closed down when war began and were reopened towards the end of 1940, when squadrons were also formed at Aberdeen, Belfast, Birmingham, Durham, Edinburgh, Glasgow, Leeds, Manchester, Nottingham, St. Andrews, and Southampton, making a total of 14.

The primary purpose of the U.A.S. is to provide flying instruction and ground training for students who, during their university career, wish to prepare themselves for commissioned service in the general duties (flying), technical or medical branches of the regular or non-regular air forces, including those of the Dominions.

Dyce A.A. Squadron's New C.O.

S/L. ALLAN LAIRD CARRIE has been appointed to command No. 2612 Light Anti-aircraft Squadron of the Royal Auxiliary Air Force, Dyce. S/L. Carrie, who has taken a R.Aux.A.F. commission, is the airport manager at Dyce, Aberdeen, for the Ministry of Civil Aviation. He served in the Royal Air Force during both world wars. Mobilized as a reservist in 1939, he was later adjutant at a fighter station and in 1942 transferred to the R.A.F. Regiment, taking over command of No. 2957 Squadron. In July, 1945, he was engaged on Regiment duties at Headquarters, No. 21 Group, Technical Training Command, serving for a year in Europe before being released.

R.C.A.F. Air Navigation School

RUNWAYS at the Royal Canadian Air Force air navigation school at Summerside, Prince Edward Island, are to be extended and strengthened to allow aircraft up to 90,000 lb in weight to be landed there. Two runways are to be lengthened to 6,000ft and one to 5,300ft, the total cost of the alterations being in the region of one and a quarter million dollars.

Summerside will be remembered as a wartime air navigation school under the British Commonwealth Air Training Plan; it was reopened last February under the R.C.A.F.'s peacetime training programme. Specialist navigation courses are scheduled to commence there in October and will include flights to air navigation schools in the United Kingdom and in the U.S.A. In addition, two high-altitude polar flights from Whitehorse, Yukon Territory, or Churchill, Manitoba, will be made in order to provide practical experience in far-northern flying.

Headed by F/L. J. G. Wright, D.F.C., who served for some time in the test and development section of the Empire Air Navigation School at Shawbury, Shropshire, the Research and Development Section (Navigation) of the R.C.A.F. will also be set up at Summerside and will work on the development of new technique and methods of air navigation.

***SEEING IT THROUGH:** Mr. Arthur Henderson, the Air Minister, in the control tower at Gatow during his recent visit to Berlin to watch the air lift of supplies. Between June 29th and July 15th, 2,461 loads were flown into the city.*

R.A.F. Promotions

THE R.A.F. half-yearly promotions published in the London Gazette of July 6 include the following:—

Air Vice-Marshal to Air Marshal.

Sir Victor Goddard, K.C.B., C.B.E., whose appointment to the Air Council as Air Member for Technical Services takes effect in August; Sir Arthur P. M. Sanders, K.B.E., C.B. Air Officer Commanding-in-Chief, British Air Forces of Occupation (Germany); Sir William Elliott, K.B.E., C.B., D.F.C. Air Officer Commanding-in-Chief, Fighter Command.

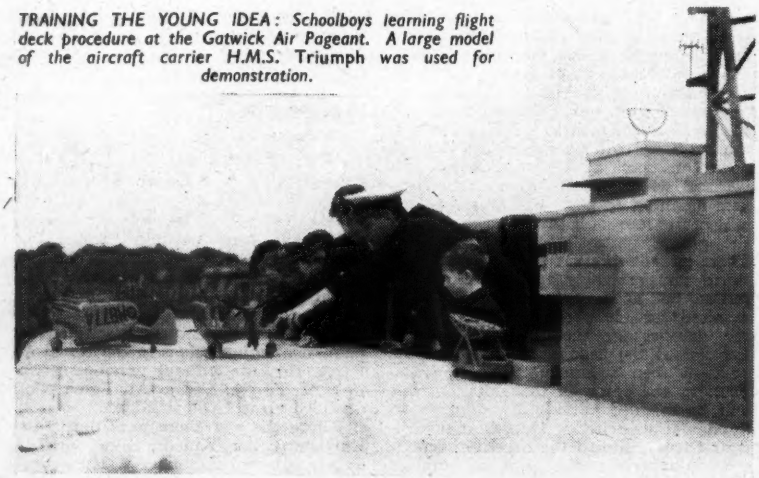
Air Commodore to Air Vice-Marshal.

L. Darvall, C.B., M.C., Air Officer Commanding No. 3 Group, Bomber Command; S. C. Strafford, C.B., C.B.E., D.F.C., Senior Air Staff Officer, Bomber Command; W. L. Dawson, C.B., C.B.E., Air Officer Commanding Air H.Q., Levant; J. D. I. Hardman, C.B., O.B.E., D.F.C., Assistant Chief of Air Staff, Operations, Air Ministry; L. G. Harvey, C.B., Air Officer Commanding, No. 24 Group, Technical Training Command; T. C. St. C. Morton, O.B.E., M.D., Ch.B., F.R.C.P., Senior Consultant and consultant in pathology and tropical medicine at the R.A.F. Central Medical Establishment.

Group Captain to Air Commodore.

J. G. Hawtry, C.B.E.; G. W. Tuttle, C.B., C.B.E., D.F.C.; E. C. Hudleston, C.B., C.B.E.; H. A. Constantine, C.B., C.B.E., D.S.O.; S. O. Bufton, C.B., D.F.C.; L. F. Sinclair, G.C., C.B., C.B.E., D.S.O., A.D.C., Commanding Officer, R.A.F. Gutersloh, B.A.F.O., Germany; H. V. Satterley, C.B.E., D.F.C., Senior Air Staff Officer at the R.A.F. Delegation, Washington; W. Wynter-Morgan, C.B.E., M.C.; G. H. Randle; W. E. Barnes, M.R.C.S., L.R.C.P., Deputy Director-General of Medical Services, Air Ministry; H. D. Jackman, C.B., C.B.E.

***TRAINING THE YOUNG IDEA:** Schoolboys learning flight deck procedure at the Gatwick Air Pageant. A large model of the aircraft carrier H.M.S. Triumph was used for demonstration.*



Reunions

IT is hoped to hold a reunion dinner at Odiham this September, when the squadron returns from its present American tour, for all officers who have served with No. 54 Squadron at any time since its formation in 1916. Further details may be obtained from F/O. E. J. Clarke, No. 54 Squadron, R.A.F., Odiham, Hants.

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The first annual reunion of the R.A.F. Coastal Command Ops Room Club has been planned for the evening of Saturday, November 27th, and will include dancing to a first-class ex-R.A.F. band. The reunion will be held at the Church House Restaurant, Great Smith Street, Westminster, and an extension of licence until midnight has been applied for. Numbers will be limited to 300 and members may each obtain a ticket for one friend. Tickets, price one guinea, including non-stop running buffet, may be had from R. C. Politeyan, 39, The Mall, Ealing, London, W.5.